

ADMINISTRATIVE RECORD DOCUMENTS

- DEP Questionnaire – Response By Craig Dallmeyer, Strube, Inc., August 11, 2006
- Radiation Protection Plan for Strube, Inc., Appendix E, F, G; Prepared by Porter Consultants, Inc. February 20, 2007.
- DEP Radioactive Materials License for Strube, Inc., - August 10, 2007
- Map of Strube, Inc. Warehouse Locations
- Strube Radium Removal Plan (2 Workers) – August 2007
- Strube, Inc. home page (www.strubeinc.net)
- Ottawa Citizen News Article, April 22, 2002
- Ontario Court of Justice, Oral Judgment, August 4, 2000 & Prosecution Disposition Report, August 30, 2000
- DEP Inspection Report – Strube, Inc., Decommissioning, October 30 & 31, 2007
- DEP Non-Compliance Letter to Strube, Inc., November 16, 2007 & Strube Reply to Non-Compliance Letter, December 5, 2007
- Experian Business Report – William P Strube Inc. September 10, 2007
- Memo to File – EPA & ATSDR Site Visit of 7 Strube, Inc., Warehouses, December 20, 2007
- EPA Confidential Memo: Possible Disposal Activities at Strube Locations – Leo J. Mullin, Cost Recovery Expert
- POLREP #1/Special Bulletin A (250k Activation) – Strube, Inc.
- Newspaper Articles - Strube, Inc.
- ATSDR Health Consultation, Strube, Inc., January 10, 2008
- Administrative Order – Strube, Inc., Commonwealth of Pennsylvania
- 10 CFR 20 – Applicable Sections
- Fax from Strube Attorney – January 30, 2008



Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building

P.O. Box 8469

Harrisburg, PA 17105-8469

August 11, 2006

717-787-3720

Bureau of Radiation Protection

Dear Aircraft Owner, Parts Distributor or Maintenance Manager,

This is a notice from the Pennsylvania Department of Environmental Protection regarding the possible presence of potentially hazardous radioactive materials at your facility in the form of old luminescent instrument gauges, dials, pointers or markers. Radium, a radioactive material, was used to activate luminescent paint in those devices. Leakage from the paint can result in exposure to personnel and contamination. Further details can be found in the Information Notice that accompanies this survey form. If you have the material described, it may be subject to licensure and controlled disposal.

Please complete the following questionnaire and return in the enclosed envelope so that we may determine whether further actions are required.

Check one.

1. ☐ This facility has luminous radium gauges, dials, pointers or other components.
2. ☒ This facility does not have luminous radium gauges, dials, pointers or other components.
3. ☐ Help is needed to determine whether any radium bearing products are present.

If radium bearing products are present:

- a. Approximately how many? ☐ Are they all intact? ☐ (YES) ☐ (NO)
- b. Is the surface of the fluorescent material open to contact on any? ☐ (YES) ☐ (NO)
- c. Is there any disassembly of the devices or disturbing of the paint? ☐ (YES) ☐ (NO)

Please provide a person to contact regarding this survey. (Please print the information below clearly)

Name Craig Dallmeyer Title CEO
Address 629 W. Market Street Marietta PA 17547
Telephone 717-426-1906 E-mail _____



Appendix G

PORTER CONSULTANTS, INC.
714 Aubrey Ave.
Ardmore, PA 19003
610-896-5353; fax 610-642-7804

PCI-TR-499

**Independent Surveys (Jan + Feb 2007) for Gamma Fields
Associated With Radium Dials at the Strube, Inc. Warehouses
Located in
Marietta, Columbia, Mt. Joy & Maytown, PA.**

Feb. 20, 2007

Prepared for:
Dr. Mark Mentzer
President & General Manager,
STRUBE, INC. Aircraft Instruments

Prepared by:

Sydney W. Porter, Jr.
Certified Health Physicist

PORTER CONSULTANTS, INC.
714 Aubrey Ave.
Ardmore, PA 19003
610-896-5353; fax 610-642-7804

PCI-TR-499

Independent Surveys (Jan + Feb 2007) for Gamma Fields Associated With Radium Dials at the Strube, Inc. Warehouses Located in Marietta, Columbia, Mt. Joy & Maytown, PA.

A. MISSION & Survey Locations :

In order to access the risk to the public and to the Strube employees, a large series of radiation surveys were performed by 2 experienced Health Physicists

(Sydney W. Porter: Board Certified Health Physicist ; Wm. Belanger: Registered Professional Electrical Engineer)

This Report includes the Strube, Inc. office at 629 Market St., Marietta, PA, as well as the Strube warehouses located on a total of 7 sites in Columbia, Marietta, Mt. Joy, & Maytown, PA. These sites occupy a total of ~ 9 acres, and these buildings contain a total of ~ 170,000 square feet. Refer to Appendix C for detailed addresses + sizes of warehouses.

B. Point of Contact:

Mr. Brian Trostle, V.P. Operations.

C. Others Present:

Fran Long & Vince Rice (both data loggers).

D. Instruments Used:

- 1. Exploranium Model GR-130 Gamma Spectrometer, Serial No. 1247, Field Calibrated using NIST-traceable Radium-226 source. Calibrated each day of use.**
- 2. Ludlum Model 19 Micro-R Meter, Serial No. 77637 ; calibrated 10/25/06.**

PORTER CONSULTANTS, INC.
714 Aubrey Ave.
Ardmore, PA 19003
610-896-5353; fax 610-642-7804

3. Eberline E-130 GM ratemeter with tungsten-shielded pancake GM probe (utilized for checking for personnel or instrument contamination). Response checked on daily basis.
4. Eberline RO-2 Ion Chamber Survey Meter, Ser# 777, cal 1/9/07.

E. Radiation Area Surveys:

1. Radiation Area Surveys were made along the outside walls of all buildings, including empty ones.
2. Radiation Area Surveys were made in the lobby of all buildings, including empty ones.
3. Radiation Area Surveys were made on each floor where Ra-226 dials were stored.
4. Radiation Area Surveys were made in each isle of all the Warehouses.
5. Radiation Area Surveys were made on each box or dial that was 0.5 mR/hr or greater.
6. Gamma spectroscopic measurements were performed to ascertain that the only radionuclide present is Radium-226 (plus daughters).

F. Summary Results

1. Over 600 gamma measurements were logged.. Hundreds more inside the warehouses were too low to log. Survey meters with a variable pitch audible signal were used to indicate were significant levels (0.1 mR/hr) of Radium dials were located.
2. Only about one dozen areas were labeled as "Radiation Area" (5 mR/hr or greater at 1 foot).
3. There were no "High Radiation" areas (100 mR/hr or greater at 1 foot). It should be noted that 2 boxes of dials were between 100 & 120 mR/hr on contact.
4. Several dozen areas were "roped off" with "Caution, Radioactive Material" tape as part of the ALARA Program to help keep worker dose low. This tape was utilized in areas > 2 mR/hr at 6 inches.

PORTER CONSULTANTS, INC.
714 Aubrey Ave.
Ardmore, PA 19003
610-896-5353; fax 610-642-7804

G. Conclusions:

1. There is no immediate threat to the health & safety of the public from the Strube Ra-226 painted dials.
2. The Strube employees that enter the Ra dial storage warehouses have been properly trained in radiation safety, and utilize proper radiation dosimetry.
3. It does not appear that the Strube employees exceeded the Public allowable dose of 100 mR/yr above background (during the past 8 months that they have worn dosimetry.).
4. The Strube Radiation Safety Plan has been amended, and will be continuously updated as more experience is gained.
5. The Radiation Emergency Plan will be expanded to include education of local emergency personnel concerning the Strube radium dial inventory.
6. The ongoing Radium dial assay & inventory efforts must be continued with input from the PA DEP, BRP.
7. Strube must apply for a PA State license to possess & store Ra-226 dial instruments within 30 days of my notification letter to you dated Jan. 22, 2007.

/s/ S.W. Porter, Jr. ; CHP.

Appendix F

PCI-TR-498

A Statistical Approach to Characterization of Radium-Containing Parts at the Strube, Inc Facilities near Marietta, PA.” (With Recommendations).

Feb. 20, 2007

Prepared for:
Dr. Mark Mentzer

**President & General Manager,
STRUBE, INC. Aircraft Instruments**

Prepared by:

William E. Belanger, PE
Registered Professional Engineer
Sydney W. Porter, Jr.
Board Certified Health Physicist

Feb 20, 2007.

A. Introduction

Strube, Inc. is a privately held aircraft instrument sales, overhaul, repair, manufacturing and R&D organization. Their inventory includes more than 428,000 line items (part numbers) representing over 58 million surplus aircraft parts, ranging from simple compasses to complex flight computers. The parts inventory fills eight warehouses of varying sizes.

A large part of this inventory was purchased as surplus from the United States Government. Many of the instruments are from World War II military aircraft, and contain radium for visibility at night. There is no way of telling from the part numbers which parts contain radium and which do not. A preliminary survey was conducted by Porter Consultants, Inc. (PCI) on January 10, 2007, and included one warehouse four storeys tall and a smaller building next to the Strube offices. The other locations were surveyed on January 25, February 1, 5 and 8. During these surveys, no radium containing parts were moved except minor relocations to reduce radiation levels in the aisles. Two boxes with surface radiation levels in excess of 100 mR/hr were temporarily moved to a low background area for assay and then returned to their original location (with some shielding added.)

The warehouse buildings are being maintained by Strube and are reasonably secure storage facilities. There is evidence of recent significant repairs to the building roof on the large warehouse and while not guarded, the warehouse buildings are locked. The radium-containing parts are in monitored storage and are not in a state where there is a significant likelihood of a discharge of radium to the environment due to exposure to the elements. There is no sign of water damage to the radium-containing parts.

This survey indicated that a percentage of the aircraft parts contain radium-226. Gamma radiation levels outside the warehouses ranged from background to about four times background, with small gamma hot spots opposite walls where significant radium-containing parts are stored. Inside the warehouses, the highest gamma radiation levels were 100 and 130 milli-Roentgens per hour in contact with two boxes. These boxes are now shielded with other aircraft parts that yield 2 mr/hr to personnel. These two boxes contained radium-226 -painted pointers and dial faces. This concentrated the radium beyond what would be expected from intact aircraft instruments. Some hot spots in contact with other packages were in the tens of milli-Roentgens per hour. The highest area readings were from two to five milli-Roentgens per hour in several aisles in the warehouses. These were roped off with radiation banner tape to prevent entry of non-radiation workers. All areas of 5mr/hr or more also have proper "Radiation Area" signs.

A few of the instruments had broken face plates, suggesting that area contamination might be a problem. No detectable contamination has been found on smears taken from several dozen broken instrument faces. Smears were taken at gamma hot spots to get an order of magnitude on

Porter Consultants, Inc
714 Aubrey Ave.
Ardmore, PA 19003-1802

Feb 20, 2007.

the potential for contamination. Two smears out of more than 200 showed removable radium contamination (about 5000 dpm / 100 sq cm) indicating some moderate contamination at two isolated spots. Refer to PCI TR-497 for further details.

Based on Strube data, two radon levels in the building were significantly elevated, with two measurements over 100 pCi/l. Fans had been installed in these high areas to exhaust the radon outside the building.

B. Personnel Exposure

The only routine entry of personnel is typically less than an hour per week to retrieve parts that are needed to conduct the business of the company. One person performs over 90 % of all entries. It is unlikely that the warehouse personnel are exposed to gamma radiation in excess of 100 millirems per year, though this has not been verified with a detailed evaluation of radiation exposures. Workers have been "badged" using electronic dosimetry for eight months, and the 8-month exposures approached 100 mrem, including material background. However background was not subtracted from these readings. Background will be subtracted retrospectively when background exposures are determined using the same dosimeter in a background location. Radon exposure also appears to be below the OSHA limit of 4 WLM per year due to the short exposure times involved.

Workers received radiation safety training from PCI on February 13, 2007. Since they carry dosimetry and are a part of a radiation protection program, this qualifies them as radiation workers. The annual dose limit for these workers is the occupational limit as of that date. Training records are maintained in the Strube records system.

C. Licensing Considerations

Strube has indicated to PCI that they do not plan to sell any of the radium-containing aircraft parts except to a licensed entity, nor do they plan to acquire any additional radium-containing parts. The remaining inventory of radium-containing parts will be sold if possible or stored until it is ---financially--- practical to properly dispose of the inventory of radium-containing parts utilizing a licensed broker. In the meantime, PCI has informed Strube that it is necessary to obtain a radioactive materials license from the State of Pennsylvania in order to legally possess the radium-containing parts. Strube has agreed to pursue a license under the guidance of PCI.

One difficulty in obtaining a State materials license is that the total inventory of radium and the number of radium-containing parts are unknown. Because of the complicated geometry of the storage warehouses, the widely varying gamma radiation levels, and the sheer number of parts involved, a detailed part-by-part inventory of the radioactive material is impractical within any short time frame.

Feb 20, 2007.

The sheer number of parts suggests that a statistical sampling method may be the best way to assess the number of contaminated parts and the total radium inventory. This will be useful for both the State licensing process and to get an approximation of the total quantity of material that will eventually need disposal, both in terms of activity weight and volume. The remainder of this document describes a statistical approach to assessing the radium possessed by Strube.

D. Selection of Potential Radium-Containing Parts

Their inventory includes more than 428,000 line items (part numbers) representing over 58 million surplus aircraft parts. Most of these parts do not contain radium. Many are nuts and bolts or aircraft canopies or other parts where radium would not be expected. The only parts expected to have been manufactured with radium are aircraft instruments where it was necessary to provide self-luminous dials for viewing in the dark. Strube has searched for more than 20 terms that indicate an aircraft instrument such as "dial", "luminous", "altimeter" or "turn and bank" that should allow the potentially radium-containing aircraft instruments to be identified from the larger inventory of all parts. The total number of aircraft instruments as a subset of the 428,000 part numbers is 22,988 part numbers based on a keyword search by part number. This selection of likely radium containing parts amounts to 891,313 individual parts. If the list is restricted to parts where Strube has 100 or more in inventory (for reasons explained later,) 394,067 items remain. This is far too many items to survey individually.

While it is unlikely the non-instrument parts were manufactured with radium, PCI expects it will eventually be necessary to check them for contamination, possibly on a spot basis, but this can only be done after the bulk of the inventory of radium has been removed from the area.

E. Statistical Methodology

There are two important quantities that are needed for licensing and for disposal. These are the total number and volume (and weight) of radium-containing parts and the total inventory of radium at the facility. The sheer number of parts makes it impractical to assay each part individually. Even after the "instrument" part numbers, based on keyword, are separated from the rest, it is impractical to survey them on an individual basis because there are 22,988 part numbers that are "instruments" potentially containing radium. The inventoried number of these parts is 891,313 items in 76,212 locations in 8 buildings.

From the preliminary survey, it was apparent that most of the aircraft instruments in the Strube inventory do not contain radium. Since the exact count of each part number is known, the total inventory can be obtained by multiplying the activity of each part by the quantity of that part possessed by Strube, then adding up those quantities over all the part numbers. Unfortunately, it is not possible to assay individual parts at their location in the warehouses because of the high

Porter Consultants, Inc
714 Aubrey Ave.
Ardmore, PA 19003-1802

Feb 20, 2007.

background. It was necessary to transport the individual parts to a low-background location (in the Strube truck bay) for assay. The logistics of accomplishing this limited the number of parts which could be assayed.

As an assumption in this analysis, it is reasonable to proceed on the basis that all instruments sharing a part number are substantially identical. Based on knowledge of the rigor in accounting for aircraft parts, it is not reasonable to expect to find instruments with the same part number, some of which have radium dials and some which do not. This has been the PCI experience for over 35 years. Any significant change in the design of an instrument is accompanied by a new part number, or at minimum a new series (such as a, b, etc.,) which becomes a new part number. Thus to find whether a series of parts contains radium, it is only necessary to examine one single part with that part number. This method can give a very accurate count of the number of aircraft parts of that part number which contain radium, and from that, the total volume (in cubic feet) that may eventually require disposal.

The count of the subset of unique part numbers which are instruments is approximately 23,000. It is necessary to use a statistical method to assay a subset of the population. This would rest on the assumption that the part numbers come from what is effectively a single population with a regular statistical distribution of activity. It is obvious that with different types of instruments in the population, the population is not homogenous and the variations in radium content are not due purely to chance. However it is possible to treat the population as effectively homogenous using the statistical parameters obtained from the smaller sample. If this is done, the result of the statistical analysis is used to derive an estimate of the percentage of radium-containing part numbers rather than an exact count, and an estimate of the total radium possessed by Strube.

F. Overall Procedure

Any statistical sampling depends on the sample being representative of the population. Central to getting a representative sample is the requirement that each member of the population have an equal probability of being sampled. Here a complication arises.

If one is interested in the proportion of **part numbers** that contain radium, a random sample would be drawn from the part numbers with an equal probability of sampling any given part number. However, if one is interested in estimating the total radium inventory or the number of **parts** (as opposed to part numbers) containing radium, then the equal probability must be spread across the individual parts, not the part numbers. This is what we have done because the need is to estimate the radium inventory and the potential number and volume of parts which may eventually need disposal.

Strube has provided PCI a spreadsheet containing all part numbers with over 100 count in inventory. This is the database used for the statistical analysis. The lack of parts with fewer

Porter Consultants, Inc
714 Aubrey Ave.
Ardmore, PA 19003-1802

Feb 20, 2007.

than 100 in inventory is not believed to be a significant omission, since there is no reason to expect that there would be any greater or smaller likelihood of radium (or quantity of radium) in these low-count parts. More important, eliminating the low-count parts from the analysis limits the possibility of an outlier significantly affecting the statistical results. We recognized beforehand that a reasonable size sample from a logistical standpoint needed to be limited to a hundred or two. If about ten percent contain radium, then only 10 to 20 radium-containing parts would be assayed. With this small number of parts in the sample, an outlier could seriously bias the result. We therefore sampled only from the population of 394,067 items which the Strube inventory indicated more than 100 units of each.

In order to produce an equal probability of sampling any individual part, the quantity of that part in inventory must be accounted for. This was done by counting the part n times, where n is the number on hand of that part. These were placed in order on a Quattro-pro spreadsheet. The first item includes 8000 parts, so it is assigned a range from 1 through 8000. There are 7179 of the second part, so it is assigned a range of 8001 through 15179 (the sum of 8000 and 7179.) There are 6300 of the third part number, so the interval from 15180 through 21479 is assigned to this part number. What is being developed is a set of numerical ranges where the size of the range is identical to the number of parts on hand of that part number. The upper end of the range is 394067, the total number of parts over 100 count. Thus by sampling any integer at random, the probability of sampling any individual part is the same. This random sampling was done by setting up a random number generator to produce integers from 0 to 394067. If the random integer falls within the range of a particular part number, that part is selected for assay. (Note that in the inventory provided by Strube, some part numbers are repeated, probably because they are stored in different warehouses. This method still produces a representative sample because the part quantities appear properly in the numbered intervals.)

Two hundred fifty random integers were generated representing a random selection of 250 parts from the inventory. This number was selected to result in a reasonable workload in the assay process as much as any desire for a level of confidence in the sample. This number can be increased later if needed. The count of each **part number** selected is roughly proportional to the number on hand because the sampling scheme is deliberately designed that way. Of course, it is not necessary to assay more than one of any part number because they are identical. Eliminating duplicate part numbers reduced the need for assay to 149 parts. This is the quantity of parts assayed or checked for the presence of radium.

As a check to assure that nothing important is missed, one of each instrument over 1000 inventory count was also assayed. These additional samples did not include any radium-containing parts, so there was no need for any adjustment to the statistical procedure.

In the estimation of the parameters of the population, the sample must then be expanded so the parts appear in their original count. Thus assays of part numbers appear more than once in the

Porter Consultants, Inc
714 Aubrey Ave.
Ardmore, PA 19003-1802

Feb 20, 2007.

sample, even though they are identical. This gave an estimate of the radium in the population of parts owned by Strube.

G. Specific Assay Procedure:

The assay was performed using an Exploranium GR-130 portable gamma spectrometer to determine the gamma radiation at a known distance from the source. This gamma survey meter is a sodium-iodide based instrument with a 256 channel analyzer. The energy response of the instrument is compensated based on the energy of the gamma "seen" by the crystal. This instrument has been compared with a calibrated ion chamber in a radium gamma field and was found to agree with the ion chamber within a few percent over a wide range of gamma intensity. Health Physics Handbook Third Edition.

The gamma constant commonly used for Ra-226 is .825 R/hr per Curie at 1 meter distance. This was derived for a radium source encapsulated with 0.5 mm platinum and includes the self-shielding of the radium and shielding from the platinum. It includes the short-lived radium decay products, mainly Pb-214 and Bi-214. It is a commonly used constant for Ra-226, but is somewhat dependent on the geometry of the situation.

For the purpose of this work, we will use the 0.825 gamma constant because of its historic use, but recognizing that a thin geometry could result in a higher gamma factor due to less self-shielding. Also, radon loss could result in a lower gamma constant.

The object of the following discussion is to derive a simplified method of assaying a radium source with greatly simplified calculation. The object is to derive a distance which will result in a 1:1 correspondence between radium activity and measured gamma radiation. By extension this can be used for a 100:1 relationship by shortening the distance by a factor of ten and 10:1 by shortening the distance from 1:1 by a factor of the square root of ten.

The gamma constant for radium-226 is defined as $R = .825 Q / d^2$

where R is the observed radiation level in R/hr
Q is the activity of radium in Ci
and d is the distance in meters.

If we desire a 1:1 correspondence between radiation and curies, then $R=Q$
by simple algebra this leaves $d^2 = .825$ or $d = .908$ meters. Converting this to inches $d = .908 \text{ m}$
 $= 35.76$ inches (approximately 3 feet.) For 10:1, $d = 35.76 / \text{root } 10 = 11.3$ inches. For 100:1, d
 $= 35.76 / 10 = 3.6$ inches.

Procedure:

Feb 20, 2007.

6. Measure background (Bkg)
7. Place the source to be assayed at 35.76 inches. If $R > 5 \times \text{Bkg}$, report $Q = R - \text{Bkg}$.
8. If $R < 5 \times \text{Bkg}$ then move to 11.3 inches. If $R > 5 \times \text{Bkg}$, report $Q = (R - \text{Bkg}) \times 10$
9. If R at 11.3 in $< 5 \times \text{Bkg}$, then move to 3.6 inches. Report $Q = (R - \text{Bkg}) \times 100$

H. Results of the Statistical procedure:

Of the 149 parts identified for assay, 21 could not be located by the warehouse personnel and were not pulled from the inventory. Therefore only 128 parts were assayed. Because of the elimination of duplicate part numbers, this is equivalent to missing 29 parts of the original 250 random sample. This yields a random sample of 221 parts rather than the intended 250.

There is no information which would lead one to believe that there was any difference between the parts not found and the parts randomly selected for assay other than the fact that they were not found. Thus, nothing suggests that the remaining sample of 221 parts is not representative of the population of "instrument" parts owned by Strube. The statistical analysis therefore utilizes a random sample of 221 parts to represent the population of parts. This population is the 891,313 parts identified by keyword as possible "instruments."

Fourteen of the assayed parts were found to contain radium. This is fourteen out of the 128 parts which were assayed, or 11 percent of the part numbers assayed. This agrees well with the preliminary estimate. This percentage cannot be extrapolated to the total population of part numbers because the sample was designed with a equal probability of sampling individual parts, not part numbers.

Because of the single assay of each part number, several of the assayed part numbers represented multiple parts from the random sample. When this was accounted for, the number of parts with radium was 17 out of a sample size of 221 parts. This sample is designed to be representative of the population of parts, so the sample suggests that 7.7 percent of the parts contain radium. Therefore, of the 891,313 parts which were flagged as "instruments" in the keyword search, $891,313 \times .077 = 68,562$ or **about 70,000 parts owned by Strube would be expected to contain radium.**

The radium content of the parts averaged ranged from 1.98 or approximately 2 microcuries with a range from a little above 6 to 0.02. The sample standard deviation is 1.93, with a standard deviation of the mean of 0.47 microcuries. Applying this to the population of 70,000 parts containing radium, this suggests a **total radium content in the inventory of 140 millicuries**

**Porter Consultants, Inc
714 Aubrey Ave.
Ardmore, PA 19003-1802**

Feb 20, 2007.

with two-sigma confidence limits of 33 mCi. THUS THE TOTAL RADIUM INVENTORY IS PROJECTED BETWEEN 107 AND 173 MILLICURIES.

I. Warehouse Surveys

In addition to the estimate of radium activity and the inventory of radium-containing parts above, problem areas and hot spots in the warehouses have been defined. PCI has conducted a survey of each warehouse to find and mark all spots where the gamma radiation level exceeds two mR/hr. This will serve as a protective measure for workers. It will also be used to try to spot any problems or radium-containing parts not discovered by the statistical method above. It is crucial to identify all parts or collections of parts such as dials and pointers which have gamma levels significantly above 2 mR/hr.

J. Non-statistical measurements

In the CB warehouse there are "engine cases" (also called "bins") and other containers with a substantial quantity of only radium-containing parts. According to Strube, these parts are inventoried and therefore should be reflected in the results of the statistical analysis. It was PCI's intent to move these containers out of the warehouse where a low-background gamma measurement could be used to determine an approximate activity. Due to the weather and the presence of large quantities of ice on the ground this could not be done prior to this writing.

K. Conclusions and Recommendations

PCI experience shows that aircraft dials with the same part number have very close to the same amount of Radium. This is because of the extremely high cost of Radium paint and the rigid specifications to which these parts were manufactured. Based on this experience, PCI does not recommend assaying more than one unit of each part number.

The assay conducted by PCI would consist of removing one instrument of each randomly selected part number to a low-radiation background area, and measuring the net gamma radiation at a measured distance. The gamma factor of radium and inverse square law can then be used to calculate the radium activity. An Exploranium GR-130 or ion chamber was used to make the gamma radiation measurements. The energy compensation of the GR-130 has previously been checked (utilizing Ra-226) against an ion chamber and found to be good.

Feb 20, 2007.

PCI estimated the total quantity of radium by assaying only one of each part number of 250 randomly selected parts. . A more detailed assay of radium activity may be needed for disposal, but this would have to be negotiated with the disposal site.

The radium content of the parts averaged ranged from 1.98 or approximately 2 microcuries with a range from a little above 6 to 0.02. The sample standard deviation is 1.93, with a standard deviation of the mean of 0.47 microcuries. Applying this to the population of 70,000 parts containing radium, this suggests total radium content in the inventory of 140 millicuries with two-sigma confidence limits of 33 mCi. Thus the total radium inventory is projected to be between 107 and 173 millicuries.

L. References

- 1 Pennsylvania Code Title 25, Article 5 "Radiological Health"
- 2 United States Code of Federal Regulations, Title 10, part 20 "Standards for Protection Against Ionizing Radiation"
- 3 NUREG 1505 "A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys", Nuclear Regulatory Commission,
- 4 NUREG-1575. "Multiagency Radiation Survey and Site Investigation Manual (MARSSIM)." Washington, D.C.: Nuclear Regulatory Commission. December 1997
- 5 NUREG /CR 5512, Volumes II, III and IV, "Residual Radioactive Contamination from Decommissioning, Nuclear Regulatory Commission. May, 1999.
- 6 NUREG /CR 5849, "Manual for Conducting Radiological Surveys in Support of License Termination," Nuclear Regulatory Commission. June, 1992.
- 7 NUREG-1507 -"Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions," Nuclear Regulatory Commission., August, 1995.

Appendix E

PORTER CONSULTANTS, INC.
714 Aubrey Ave.
Ardmore, PA 19003
610-896-5353; fax 610-642-7804

PCI-TR-497

**Independent Surveys (Jan + Feb 2007) for Removable Radioactive
Contamination at the Strube, Inc, Warehouses Located in
Marietta, Columbia, Mt. Joy & Maytown, PA.**

Feb. 20, 2007

Prepared for:
Dr. Mark Mentzer
President & General Manager,
STRUBE, INC. Aircraft Instruments

Prepared by:

Sydney W. Porter, Jr.
Certified Health Physicist

PORTER CONSULTANTS, INC.
714 Aubrey Ave.
Ardmore, PA 19003
610-896-5353; fax 610-642-7804

PCI-TR-497

**Independent Surveys (Jan + Feb 2007) for Removable Radioactive
Contamination at the Strube, Inc, Warehouses Located in
Marietta, Columbia, Mt. Joy & Maytown, PA.**

A. Response Locations :

This Report includes the Strube, Inc. office at 629 Market St., Marietta, PA, as well as the Strube warehouses located on a total of 7 sites in Columbia, Marietta, Mt. Joy, & Maytown, PA. These sites occupy a total of ~ 9 acres, and these buildings contain a total of ~ 170,000 square feet.

B. Point of Contact:

Mr. Brian Trostle, V.P. Operations

C. Others Present:

Fran Long & Vince Rice

D. Instruments Used:

1. Exploranium Model GR-130 Serial No. 1247, Field Calibrated using NIST-traceable Radium-226 source. Calibrated each day of use.
2. Ludlum Model 19 Micro-R Meter, Serial No. 77637; calibrated 10/25/06.
3. Eberline E-130 GM ratemeter with tungsten-shielded pancake GM probe (utilized only for screening swipes). Response checked on daily basis.

PORTER CONSULTANTS, INC.
714 Aubrey Ave.
Ardmore, PA 19003
610-896-5353; fax 610-642-7804

4. LAB INSTRUMENTS: Eberline Dual Channel Scaler, Model SAM-2, Ser # 569 with Johnson Alpha Detector, Model ASP-2A, Ser # 973. Calibrated with an NBS Traceable Th-230 Alpha Standard.

E. Radioactive Contamination Surveys:

1. Radioactive Contamination Surveys were made in the lobby of all buildings, including empty ones.
2. Radioactive Contamination Surveys were made on each floor where Ra-226 dials were stored.
3. Radioactive Contamination Surveys were made in each isle where the dose rate was 0.5 mR/hr or greater.
4. Radioactive Contamination Surveys were made on each box or dial that was 2 mR/hr or greater.

F. Results (refer to Attached SMEAR COUNTING LOGS for details):

1. Over 200 smears were taken, screened, and then counted on lab equipment. All smears were allowed to decay for more than 1 day to remove radon daughters.
2. Only 16 smears exceeded the very conservative limit of 20 d/m/100 sq cm (NRC Reg Guide 1.86).
3. Only 6 smears exceeded 100 d/m/100 sq cm. These areas were immediately cleaned with a HEPA filter vacuum cleaner down to below 20 d/m/100 sq cm. (Respirators worn)
4. All areas > 20 d/m/100 sq cm will be cleaned to below this limit.

G. Work Performed By :

1. S.W. Porter, Jr. CHP
2. Wm. Belanger PE



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF RADIATION PROTECTION

Page 1 of 2 Pages
License No. PA-1004
Amendment No. NEW

RADIOACTIVE MATERIALS LICENSE

Pursuant to the Radiation Protection Act, the Act of July 10, 1984 (No. 147, P.L. 688) (35 P.S. §§ 7110.101 - 7110.703) and Title 25. Rules and Regulations, Article V. Radiological Health of the Pennsylvania Department of Environmental Protection, and in reliance on statements and representations heretofore made by the Licensee, a license is hereby issued authorizing the Licensee to receive, acquire, possess, transfer, and use radioactive material listed below for the purposes and at the places designated below. This license shall be deemed subject to all applicable rules, regulations, or orders of the Pennsylvania Department of Environmental Protection now or hereafter in effect and to any conditions specified below.

1. Licensee : In response to applications submitted
Strube Inc. : Feb 20, 2007 through Aug 9, 2007
: 3. License No. PA-1004 is issued as
2. 629 Market Street : follows:
Marietta, PA 17547 :
: 4. Expiration Date: May 31, 2012

5. Radioactive material (Element & mass number)	6. Chemical and/or physical form	7. Maximum amount that licensee may possess at any one time under this license
--	-------------------------------------	--

A. Radium 226	A. Any	A. 175 millicuries
---------------	--------	--------------------

8. Authorized Use

A. Possession of in-situ radioluminescent devices; facility and equipment contamination. Characterization and repackaging of devices. Decontamination pending offsite disposal. Delivery to an authorized shipper for shipment of the devices and contamination to a licensed disposal site

CONDITIONS

9. Locations of use: 637 West market Street, Marietta, PA 17547.
1280 Franklin Street, Columbia, PA 17512.
172 South Second Street, Columbia, PA 17512.
224-228 Locust Street, Columbia, PA 17512.
240 West Main Street, Mt. Joy, PA 17552.
131 East High Street, Maytown, PA 17550.
693 West Market Street, Marietta, PA 17547.
10. Radiation Safety Officer: Brian Trostle.
11. Licensed material listed in Item 5 above is authorized for use by, or under the supervision of Brian Trostle.
12. The licensee shall conduct an ongoing physical inventory to provide for an accurate statistical accounting for all devices containing licensed material possessed.
13. The Decommissioning Funding Plan shall be reviewed annually and appropriate changes to Financial Assurance vehicle made.
14. Radium containing devices shall not be opened.

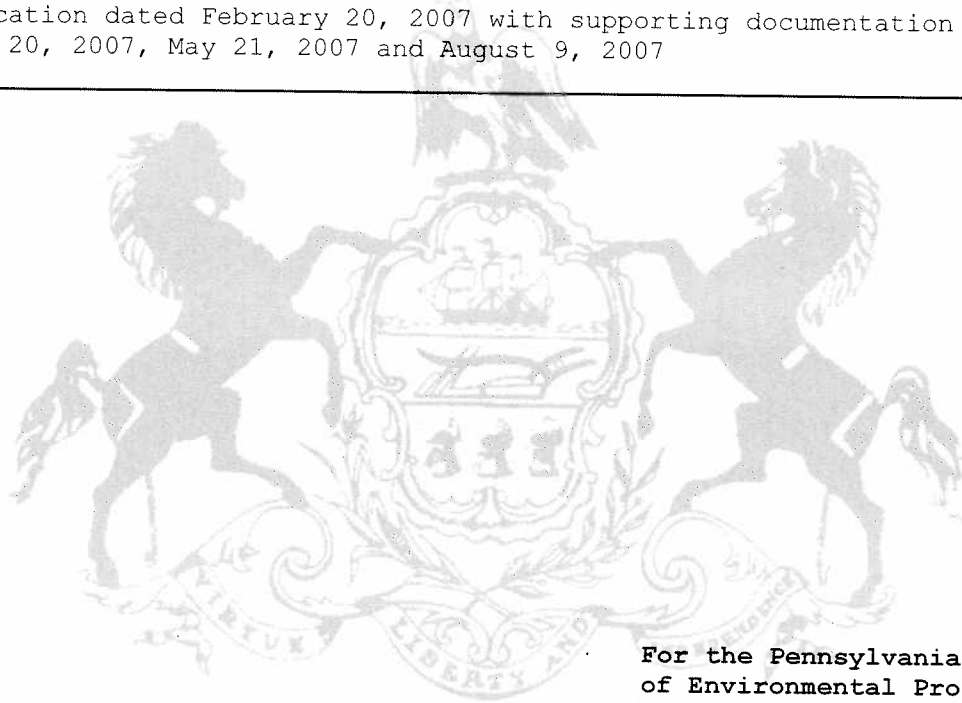


COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF RADIATION PROTECTION

Page 2 of 2 Pages
License No. PA-1004
Amendment No. NEW

RADIOACTIVE MATERIALS LICENSE

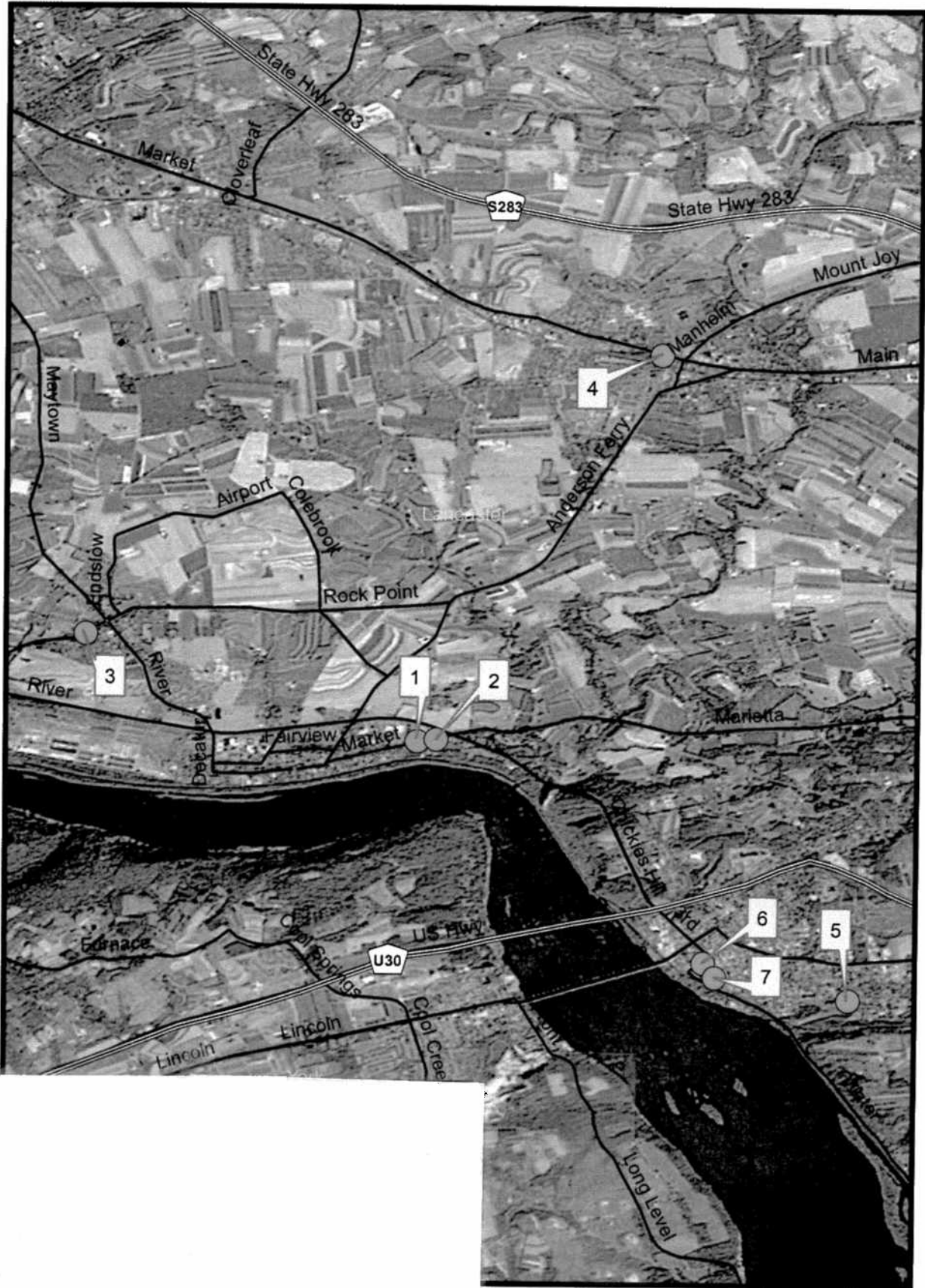
15. The licensee shall perform decontamination surveys with appropriate instrumentation as stated in NUREG-1757.
 16. The licensee may transport licensed material, or deliver licensed material to a carrier for transport, in accordance with 25 PA. Code Chapter 230, "Packaging and Transportation of Radioactive Material" and the provisions of 10 CFR Part 71 incorporated by reference.
 17. Notwithstanding the requirements set forth in this license, the license shall comply with the regulations set forth in Title 25 of the Pennsylvania Code Article V "Radiological Health" and the U.S. Nuclear Regulatory Commission, Title 10 Code Of Federal Regulations Parts 19-150 incorporated by reference.
 18. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Department of Environmental Protection's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.
- A. Application dated February 20, 2007 with supporting documentation dated April 20, 2007, May 21, 2007 and August 9, 2007
-



**For the Pennsylvania Department
of Environmental Protection**

Date: August 10, 2007

Ronald J. Hamm
Bureau of Radiation Protection
P. O. Box 8469
Harrisburg, PA 17105-8469



Radium Removal Plan (2 Workers)

ID	Task Name	Start	Finish	Duration	Gantt Chart											
					Jan 2007	Jan 2007	Aug 2007	SEP 2007	Oct 2007	Nov 2007	Dec 2007					
1	224-228 Locust St., Columbia, PA 17612	6/1/2007	8/1/2007	43.5d												
2	Removal	6/1/2007	7/30/2007	42d												
3	Contamination cleaning	7/31/2007	7/31/2007	1d												
4	Final Survey	8/1/2007	8/1/2007	5d												
5	172 S. Second St., Columbia, PA 17612	8/1/2007	11/28/2007	84.5d												
6	Removal	8/1/2007	11/23/2007	83d												
7	Contamination cleaning	11/28/2007	11/27/2007	1d												
8	Final Survey	11/27/2007	11/28/2007	5d												
9	1288 Franklin St., Columbia, PA 17612	11/28/2007	3/7/2008	72.5d												
10	Removal	11/28/2007	3/5/2008	71d												
11	Contamination cleaning	3/6/2008	3/6/2008	1d												
12	Final Survey	3/7/2008	3/7/2008	5d												
13	240 W. Main St., Mt. Joy, PA 17652	3/7/2008	8/25/2008	121d												
14	Removal	3/7/2008	8/20/2008	119d												
15	Contamination cleaning	8/21/2008	8/22/2008	1d												
16	Final Survey	8/22/2008	8/25/2008	1d												
17	131 E. High St., Maytown, PA 17650	8/25/2008	9/24/2008	21.5d												
18	Removal	8/25/2008	9/19/2008	20d												
19	Contamination cleaning	9/22/2008	9/23/2008	1d												
20	Final Survey	9/23/2008	9/24/2008	5d												
21	637 W. Market St., Marietta, PA 17647	9/24/2008	12/1/2008	49d												
22	Removal	9/24/2008	11/29/2008	48d												
23	Contamination cleaning	12/1/2008	12/1/2008	1d												
24	Final Survey	12/2/2008	12/2/2008	5d												
25	693 W. Market St., Marietta, PA 17647	12/2/2008	1/3/2009	23.5d												
26	Removal	12/2/2008	12/31/2008	22d												
27	Contamination cleaning	1/1/2009	1/2/2009	1d												
28	Final Survey	1/2/2009	1/3/2009	5d												



STRUBE, Inc.

Contract Manufacturing Services
DOD and Homeland Security Contractor
Electromechanical Assemblies, PCBAs,
cable/harnesses, and plastic molded components,
Build-to-Print, or In-House Design
FAA Repair Station
Worldwide Supplier of Military Surplus
Registered Small Business
Sub-Contractor to DOD Primes

Registered ISO 9001:2000

Cage Code #54034

- ▶ Home
- ▶ About Us
- ▶ Profile / R&D
- ▶ Manufacturing
- ▶ Repair Services
- ▶ Surplus Inventory
- ▶ Contact Us

Strube, Inc., located in Marietta, PA, is a privately held, multi-faceted, aircraft instrument sales, overhaul, and repair; manufacturing; and research and development organization. We serve a worldwide base of U.S. Department of Defense (DOD), FAA, and commercial customers. Incorporated in 1958, we have been in the surplus aircraft component business for nearly 50 years. Our inventory has over 428,000 line items representing over 58 million surplus aircraft parts, ranging from the simplest wet compass to the most complex flight components and spacecraft navigational equipment.

Our MRO Business Unit (Maintenance, Repair and Overhaul) FAA Repair Station, established in 1973, is a certified FAA Repair Station OX1R390K, for Instrument Classes 1, 2, 3 and 4, and an accessories rating. Our experienced technical staff is capable of repairing and overhauling most instruments and accessories.

Strube, Inc. manufactures proprietary electromechanical products as well as build-to-print systems for the DOD and the aerospace industry. We are a "Registered Small Business" sub-contracting for Government Primary Suppliers. We are also engaged in research and development of advanced aircraft fuel systems. Strube recently patented an accurate electro-optic brass board liquid quantity measurement system, and participates in next-generation aircraft improvement programs.

Strube, Inc. | 629 West Market St | Marietta, PA 17547 | 800-233-0247 | 717-426-1906 | 717-426-1909 fax | info@strubeinc.net

©2005 Strube, Inc. | Web Design::Tin Roof Designs

Copyright 2002 CanWest Interactive, a division of
CanWest Global Communications Corp.

All Rights Reserved

Ottawa Citizen

April 22, 2002 Monday Final Edition

SECTION: News; Pg. A1

LENGTH: 1096 words

HEADLINE: Deadbeat polluters owe millions: Guilty parties in some of Ontario's most outrageous environmental offences have yet to pay a penny or spend a minute in jail. Kate Jaimet reports.

SOURCE: The Ottawa Citizen

BYLINE: Kate Jaimet

BODY:

In October 1990, Erie Battery Inc. pumped raw battery acids onto a field in Port Colborne. While awaiting trial for that offence, the battery recycling company was caught again dumping battery acids, lead, and other industrial wastes onto the environment. The company, headed by president Joseph Ted D'Amico, was eventually fined \$300,000. It never paid a penny.

From December 1998 to February 1999, Riverside Grain Products polluted the air in Thunder Bay, with foul odours from its open-air waste treatment tanks. After dozens of complaints from neighbours, the company was fined \$100,000 for failing to stop the stench. Riverside's Alabama bosses, Bobby Harvey and Chester Wright III, shut down the plant in January 2000, leaving the environmental fine -- plus employee salaries and more than \$1 million in municipal taxes -- unpaid.

Between September 1996 and March 1997, Aquatech Blue Ltd. dumped hazardous waste into Lake Ontario and poured industrial chemicals into Toronto's sewer system. The American owners of the waste disposal company didn't show up for their court date, stiffing the Ontario government for more than half a million dollars in unpaid fines.

In all, documents obtained from the Ontario Ministry of the Attorney General show that companies owe more than \$3.8 million in unpaid environmental fines dating back to 1990. The documents, obtained by the Citizen after more than a year of freedom of information applications and appeals, do not include environmental fines against individuals, which the department refused to release.

See DEADBEATS on page A10

In his autumn 2000 report, Ontario's auditor noted that more than \$10 million in environmental fines remained unpaid by companies and individuals, and demanded that the government should "more effectively enforce payment and environmental legislation."

In 1998, the Ontario government began transferring the responsibility for collecting the backlogged fines to municipalities. The question now is whether Ontario towns and cities will be any more successful than the province in forcing deadbeat polluters to pay their dues.

"It is a burden. A lot of it may be deemed uncollectible," said Kathy Dallaire, supervisor of provincial offences in the Thunder Bay court district. The district's 18 municipalities plan to hire a collection agency to go after \$9 million in back fines for a variety of provincial offences.

One of the biggest fines ever imposed -- and never paid -- for an environmental offence in Ontario came out of the Aquatech Blue case, which went to court in July 2000.

Craig Dallmeyer, a Pennsylvania property developer and trailer-park owner, began operating Aquatech Blue in 1994 in an oil recycling refinery on the shore of Lake Ontario. The company was supposed to process hazardous industrial waste to make it safe for disposal. Instead, it accepted the waste, pocketed its fee, and let the chemicals accumulate, periodically dumping truckloads of contaminated waste down the city's sewers, including one that emptied into Lake Ontario.

Evidence at the trial revealed that one rusty orange storage tank bulged with such an overload of hazardous waste that employees nicknamed it "the pumpkin." The accumulation of chemicals stored unsafely on the site made it "an accident waiting to happen," said Ontario Environment Ministry prosecutor Jerry Herlihy.

"The judge did make a comment in the course of sentencing that this was a 'disgraceful picture of greed,' " Mr. Herlihy said.

The judge handed down a \$193,000 fine and a six-month jail term for Aquatech founder Dallmeyer; \$130,000 and four months in jail for corporate director Morgan Whitely; \$40,000 and six months in jail for plant manager Robert Weddle; and \$720,000 in fines to the company. None of the men, all U.S. residents, attended the trial and none has returned to Ontario to serve jail time.

Records show that Aquatech Blue -- now defunct -- still owes \$527,000 in fines. The Ontario Attorney General's department refused to disclose whether the men's personal fines have been paid.

Barry Randell, director of court services for the City of Toronto, said the city will try to go after Mr. Dallmeyer and other polluters who refuse to pay up. In Mr. Dallmeyer's case, it's not for lack of money that the fine remains unpaid: tax records show he owns property worth more than \$6 million in Mount Wolf, Pennsylvania.

Mr. Dallmeyer did not return phone calls placed to his business office Friday.

Although Aquatech is the most egregious of defaulters, Ontario government records show a dozen companies still owe \$100,000 or more in environmental fines:

- Amroad Industries, run by Peter, Danny and Ronald Chomyn, owes \$100,000 for abandoning 1,200 trucks of garbage at a site in Etobicoke in February 1993. Danny Chomyn was also the principal officer of two more companies -- Can-Mar Group Ltd. and 953871 Ontario Ltd -- which owe \$200,000 for illegally dumping waste on an industrial lot in Mississauga. The landlord of that site said the cleanup cost him \$1.2 million.

- Clean Soils Ltd. owes \$130,000 for improperly managing a contaminated soil remediation site in the Hamilton harbour. The soil, contaminated with petroleum hydrocarbons and arsenic, risked poisoning the harbour through rainwater runoff.

- Leaside Recycling and a related numbered company owe \$175,000 for stuffing up to 2,000 tonnes of smelly but non-hazardous garbage between 1993 and 1995 on a Toronto site approved to hold 30 tonnes.

- The Industrial Group of Canada, owned by Diego Monaco, owes \$100,000 for filling a warehouse in Vaughan with used tires, pocketing a \$21,400 disposal fee, and then abandoning the warehouse, leaving the landlord with \$54,800 in cleanup costs.

Although all of these companies have since disappeared, Brian McQuaid, president of the collection agency McGrath Canada, said that doesn't necessarily mean the fines are uncollectible.

"If the company's out of business, we would go after the principals," he said. "But you're probably looking at a court battle."

Prosecutors like Mr. Herlihy sometimes ask for large environmental fines against companies, even if they know the fine will probably never get paid. That's because big fines are one way of bankrupting unrepentant polluters before they do even more damage.

"The name of the game is to get people into compliance or drive them out of business," Mr. Herlihy said. "That's what it was in the Aquatech case."

LOAD-DATE: April 22, 2002