Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

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Written submission from Gregory Csullog

Mémoire de Gregory Csullog

In the Matter of the

À l'égard des

Canadian Nuclear Laboratories (CNL)

Laboratoires Nucléaires Canadiens (LNC)

Application from the CNL to amend its Chalk River Laboratories site licence to authorize the construction of a near surface disposal facility

Demande des LNC visant à modifier le permis du site des Laboratoires de Chalk River pour autoriser la construction d'une installation de gestion des déchets près de la surface

Commission Public Hearing
Part 2

Audience publique de la Commission
Partie 2

May and June 2022

Mai et juin 2022

Canada

The following was submitted to the North Renfrew Times on Mar 2, 2022. The NRT chose not to publish the article.

Terry:

Routinely the NRT publishes articles of interest by specialists. I submit the following and request that it be published in a future edition of the NRT.

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About the Author

Greg Csullog worked at Chalk River Laboratories (CRL) from 1982 to 1999 and 2006 to 2010. He also worked at the International Atomic Energy Agency (IAEA) from 1999 to 2006. His duties during his time in the field of radioactive waste management included: (CRL) Waste Inventory Information Specialist, Leader of the Waste Inventory Program, Leader of the Waste Inventory Control Section and (IAEA) Program Officer for the Net Enabled Radioactive Waste Management Database (NEWMDB), Responsible Officer for (a) development of an Indicator of Sustainable Development for Radioactive Waste management (ISD-RW) and (b) the "Radioactive Waste Management Status and Trends" document series (editor, main author), and Scientific Secretary for the "Managing Radioactive Waste Information Systems" Project. For additional details refer to Greg's public LinkedIn profile: https://ca.linkedin.com/in/greg-csullog-56927420

This article is targeted at individuals with little or no knowledge of radioactive waste management, notably in support of disposal.

To dispose of radioactive wastes, the proponent of a disposal facility needs to address the following:

(1) do you have enough knowledge of the characteristics of your wastes to decide their final disposition option(s)?

(2) if there are multiple disposition options (near surface, intermediate depth disposal, deep disposal), are you capable of tracking wastes from point of origin to their final and correct disposition?

(3) do you have confidence that your disposition options will result in acceptable risks to current and future generations?

The proponent cannot demonstrate (3) if it does not understand what it needs to manage (1) and if it cannot ensure that it can put the right wastes in the right place (2). A safety assessment of a disposal facility (3) is suspect if (1) and (2) are suspect and currently (1) and (2) are suspect for the Near Surface Disposal Facility (NSDF) project, as I will elaborate on below.

In the following, I will not focus on decommissioning wastes generated at CRL but, instead, I will focus on "stored" waste that the NSDF project proposes to emplace into the NSDF. However,

one thing is worth noting regarding decommissioning wastes. At the outset of the NSDF project, the proponents argued that the CRL site needed to undergo a makeover, which meant tearing down many buildings. It was argued that the NSDF had to be licensed ASAP since it was needed for the decommissioning waste to be generated. I cannot remember which NRT edition featured CRL staff that discussed taking down over 100 buildings at CRL - this was done in the absence of a licensed, operating NSDF. So much for the bogus argument on the dire need for the NSDF.

Stored waste, that's a thorny issue as you will see.

If you do not recall, it was first proposed that the NSDF would be used to dispose of both low level radioactive waste (LLW) and intermediate level radioactive waste (ILW). Clearly from the first release of the Environmental Impact Statement (EIS) for the NSDF, the proponents did not know the proper definition of ILW. The EIS used the definition in the context of handling ILW, not the IAEA definition for disposal of ILW. Why is this important? First, it showed the deep lack of knowledge about LLW and ILW, which in itself was astounding. Second, the IAEA definition of ILW is tied to its long term management and without an understanding the nature of ILW, who would trust the proponents to manage it properly?

The initial release of the EIS included the following figure:

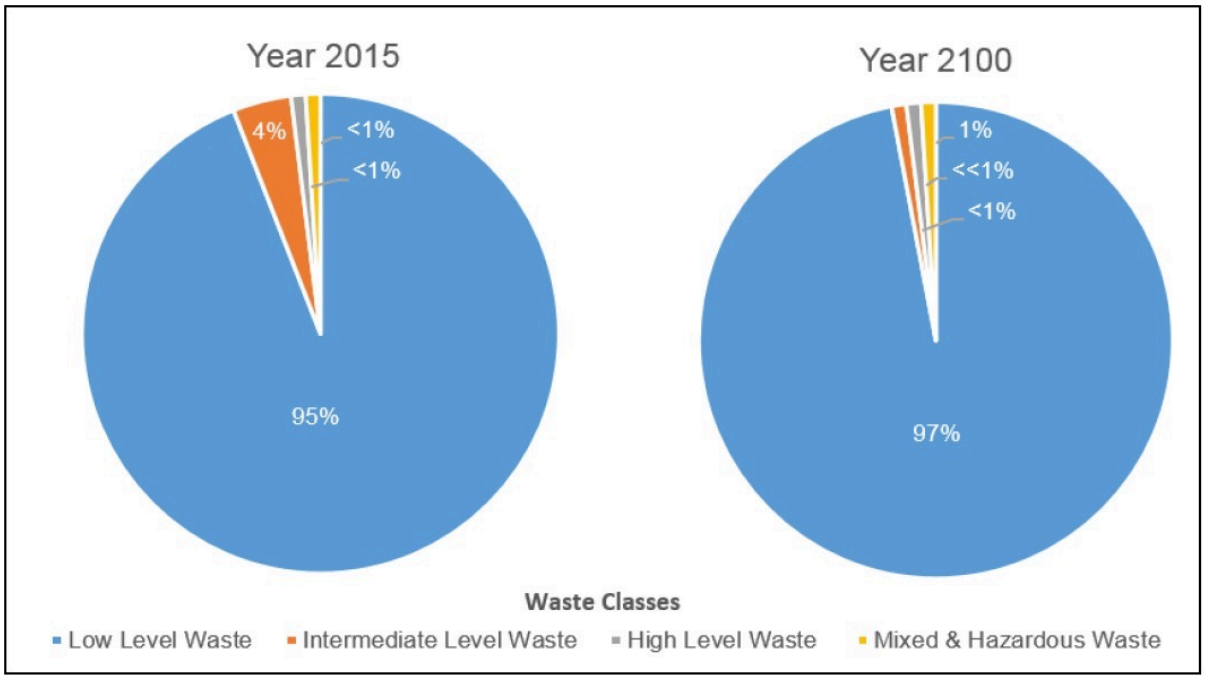

Figure 2.2-2: Canadian Nuclear Laboratories Waste Classes in Storage by Volume in 2015 and Predicted in 2100

To anyone unfamiliar with radioactive wastes at CRL this might seem reasonable. However, the figure is extremely misleading and the very fact that the proponents of the NSDF used it to justify what wastes would be emplaced into the NSDF is truly worrisome. The fact that the Canadian Nuclear Safety Commission did not take the NSDF project to task over this is disconcerting, to be polite.

The distribution of LLW and ILW in the figure represents, I think properly, the distribution of wastes as generated. However, it does not represent the distribution of LLW and ILW as managed. To put this into context, a little analogy follows.

Suppose you bought 1L (1000 ml) of pure, spring bottled water and that you read the analysis on the label. You would certainly trust the water to drink it. Now, suppose somehow that water was mixed with 1 ml of water that had 5 mg/L of microcystin-LR, a common toxin from algae. The resultant water would have 5 micrograms of microcystin-LR or roughly 3 times the Ontario drinking water standard. Now, that water would not be safe for you to drink.

How does the analogy apply to LLW and ILW. For the vast majority of time that radioactive wastes were generated, collected and stored at CRL, LLW and ILW were not characterized, labeled, and tracked and most were not managed separately. Simply put - a lot of LLW and ILW were stored together in unmarked packages. The amount of long-lived radionuclides that would cause LLW to become ILW is so low that mixing a small amount of ILW with LLW would mean the mix of LLW and ILW wastes would have to be re-classified as all ILW, just as contaminating 1000 ml of water with 1 ml of toxic water would turn drinkable water into non-drinkable water.

Why were LLW and ILW mixed at CRL?

For two reasons. First, CRL did not classify wastes as LLW, ILW, etc, until very recently. It was only in the early to mid-1990's that CRL started to classify wastes according to where they would be best stored and possibly disposed, typically based on estimated waste characteristics (not actual waste characterization). That approach fell into disarray while I was at the IAEA and upon my return to CRL in 2006 I was asked to rebuild the program. By the time I left CRL in 2010, the program had not yet been built back to where it was in 1999. Prior to the 1990's wastes were not classified as would be commonly accepted today. They were placed into storage based on where they were generated, the radiation field they emanated, and the size, shape and weight of packages. They were NOT classified as LLW and ILW so, as I argued in my review of the EIS, how could the Figure presented in the EIS, which described the distribution of wastes in storage, be defended? How did CRL respond to my comments? Instead of discussing LLW and ILW the discussion changed to LILW; that was deliberate obfuscation of the issue.

Second, as mentioned previously, a lot of ILW that would not be suitable for the NSDF was contaminated with long-lived radionuclides that did not have measurable radiation fields so they were grouped with low radiation field LLW. The thinking was, low field = low activity. Unfortunately, low radiation field waste can have levels of long-lived radionuclides that precludes their disposal in a facility like the NSDF. That describes a lot of waste stored at CRL, which the NSDF project wants to place into the NSDF.

In the March 2, 2022 edition of the NRT, a CNSC spokesperson wrote, "All items disposed of in the proposed Near Surface Disposal Facility (NSDF) would be required to meet established waste acceptance criteria to assure compliance with operational and long-term safety requirements". Of course, that is understandable and a given. However, the CNSC does not seem to grasp what I have written so far about LLW and ILW and would seem to have

underestimated the huge effort if would take to adequately characterize stored waste, much of it a mish-mash of unsegregated, unmarked, uncharacterized, mixture of LLW and ILW. As I wrote to the CNSC on a previous occasion, CRL will HAVE to consider a non-surface disposal option for clearly identified ILW. As a result, the CNSC should advise the NSDF project that it would be better off considering a non-surface option for this mish-mash.

In December 2021, principals at the Ottawa River Institute (Ole Hendrickson, Lynn Jones) asked me to comment on an AECOM report on characterization of CRL wastes. My response follows. It is an important component of this article. My response was reviewed by a former senior manager in Waste Management and Decommissioning at CRL who wrote, "I agree with Greg's comments. I also contacted a friend with extensive experience of waste management operations at Chalk River. He also agreed that Greg is correct in all of his comments.".

<< start of my response >>

Without seeing the AECOM report… ...it's essentially impossible to assess the merits… ...As you know, I have often stated the following:

• As of 2010 when I left AECL, the LLW and ILW classifications were not in use. The WIP-III waste class codes were in use to estimate storage and disposal options based on estimated waste characteristics of newly generated wastes (not previously generated wastes) and estimated waste repository limits (improved sand trench - the closest thing to the NSDF, IRUS - a vault concept, and greater than IRUS). Any talk about managing wastes as LLW and ILW prior to that time is nonsense because it just was not done.

• Wastes were not segregated by LLW and ILW prior to 2010 but, instead, were segregated according to radiation field measurements for handling and storage purposes. This has NOTHING to do with long term management needs, i.e., disposal.

• By 2010, only two waste streams had been characterized in detail **[redacted]**. Those were incinerator ash and bales (compacted bags of waste). Both of these streams represented the low end of radioactivity in wastes at the time and without characterization they would likely have been considered LLW although they were not officially classified as such because that classification was not in use at AECL.

Incinerator ash, because of concentration of things like lead should likely be handled as mixed waste (toxic-hazardous / radioactive). As such, ash might not be suitable for the NSDF unless the NSDF meets hazardous landfill standards.

Bales, at the time, were candidates for IRUS (greater containment than the NSDF) but an assessment by a Whiteshell staff member (Peter Baumgartner, 2008) concluded that because of in-growth of some nuclides, the bales might not even be suitable for IRUS (with in-growth IRUS limits would be exceeded over time) and might have to be disposed at depth.

So, these two waste streams, which represented the lowest level activity wastes generated in the 90's might not be accepted for disposal in the NSDF. In addition, the bags of trash that were

incinerated or baled were selected as subsets of waste generated at CRL at the time to exclude higher field bags (>100 mR/h as I recall) and no bags from known alpha waste generating facilities. So, there were waste bags being generated that were even less likely to be NSDF candidates.

Prior to the incineration and baling of bags, all these trash bags were not segregated for the most part so wastes stored in bunkers and trenches would likely be classified as ILW by today's standard since ILW was not segregated from LLW. As mentioned above, even when the highest activity bags and alpha suspect bags were kept separated, the resulting ash and bales still would likely not be acceptable in the NSDF (again, the low end of radioactivity at CRL)

Basically, bad past practices would make it extremely difficult for anyone to determine how much LLW and ILW was stored and that puts any estimate like done for the JC [Joint Convention] in the suspect category. The fact that the numbers were adjusted from JC report to JC report does not surprise me as those doing the work are likely working with very poor data.

So, fine tuning the JC estimates of LLW and ILW, for me, is smoke and mirrors. Using those fine tuned estimates as a basis for estimating the NSDF inventory and suitability for emplacing recovered wastes in the NSDF is even more smoke and mirrors.

<< end of my response >>

To conclude, when I see enthusiasm of local councils, the CNSC, etc. to license and get on with the NSDF I have to shake my head and wonder how ill informed are they. Making a decision on bad information is as bad as making an uninformed decision.

I hope this article sparks debate about the proposed inventory for the NSDF. Notably, I did not even deal with the failure of the NSDF project to adequately address "are you capable of tracking wastes from point of origin to their final and correct disposition". Given what I have seen so far "Me thinks not!"

Greg (from my Mac Mini)
We make a living by what we get - We make a life by what we give
and as Tom Wilson said, *"dig it til the sun goes down"*
#StandWithUkraine

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

- original “big-picture” presentation given to AECB July 1995
- it described WM&D plans to develop & implement the:
  - integrated operating procedures
  - WIP-III database
  - compliance monitoring system
  - waste identification program

  15 team members,
  $1M/year
  25% of WM&D budget
- over two years, everything that was promised was delivered on time and a little under budget
- the AECB was not told about the success (a mgmt decision)
- 1995 presentation revived to show “FNO” compliance in 1998

✓ = implemented in the 1990’s

✘ = abandoned or misused post 1999

1

This presentation was prepared based on a request by Ken Hawrelluk at a Waste Management Program weekly meeting January 14, 2010.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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Fac. Nuc. Ops Strategic Objectives & Key Targets 1998:

- **CRL has developed a cost-effective waste management program (FNO Objective C11)**
- **CRL's waste inventory is being defined (FNO Key Target S9.5a)**

objectives and targets met via the Integ. Op. Proc. (IOP) ✓ ✘

2

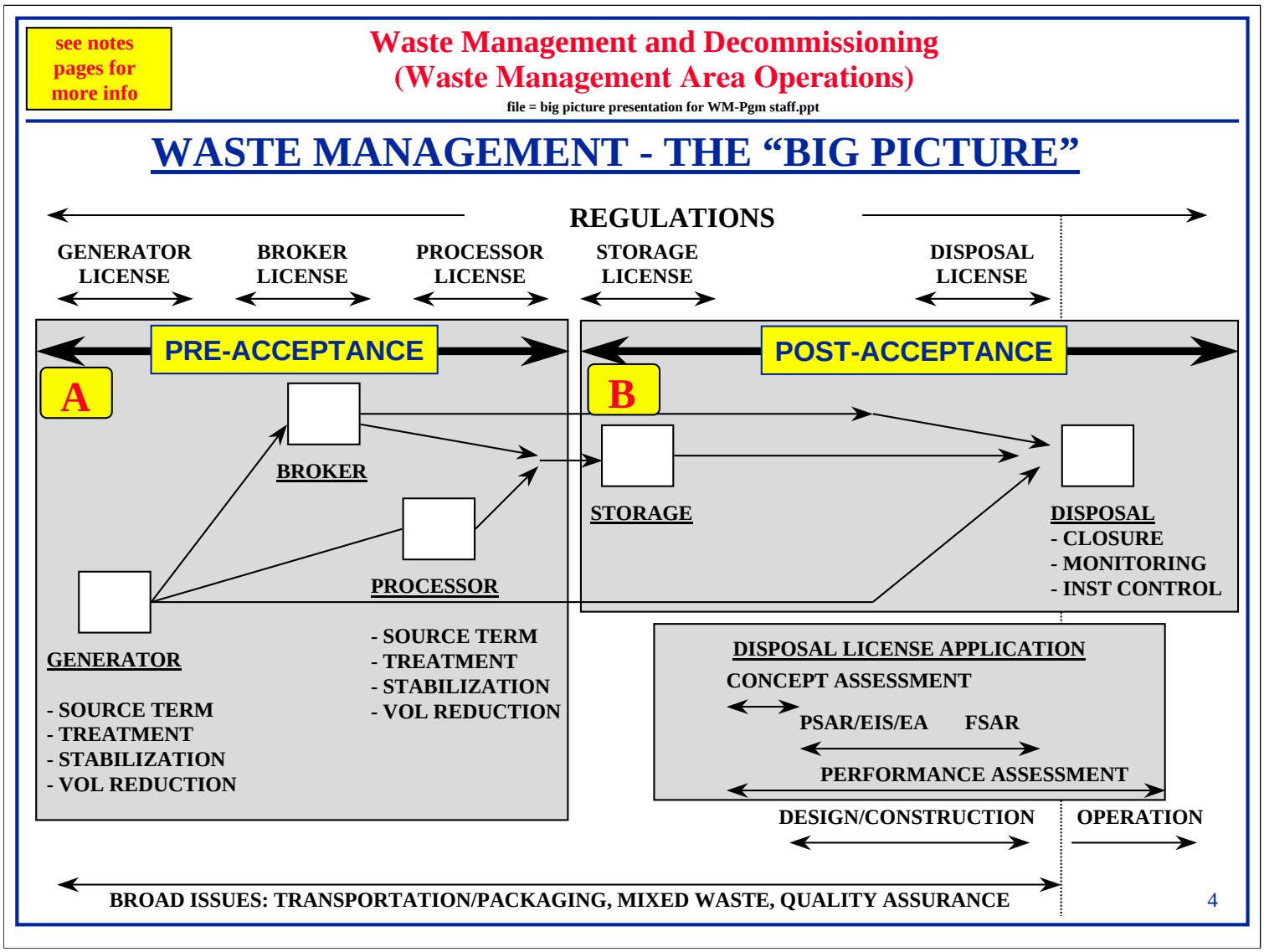
IOP abandoned because pre-acceptance not considered part of WMA procedures

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

- radwaste mgmt “big picture” presented on next slide
- A and B illustrate where IOP fit into “big picture”



This slide, which is based on documentation from the Nevada Test Site's QA program in the US, was first created by Greg Csullog for WM&D in the late 1980's. The purpose was to provide a "big picture" overview of the major activities, functions and processes involved in managing radioactive wastes.

Basically, generators produce radioactive wastes and they want a waste management facility to take these wastes and their associated liability. This PowerPoint slide show discusses WM&D's process (in the 1990's) for accepting wastes from on- and off-site radwaste generators and for managing them up to and including their disposal.

The [A] and [B] markers in this slide indicate where components of the waste management process fit into the big picture (self-explanatory in subsequent viewgraphs)

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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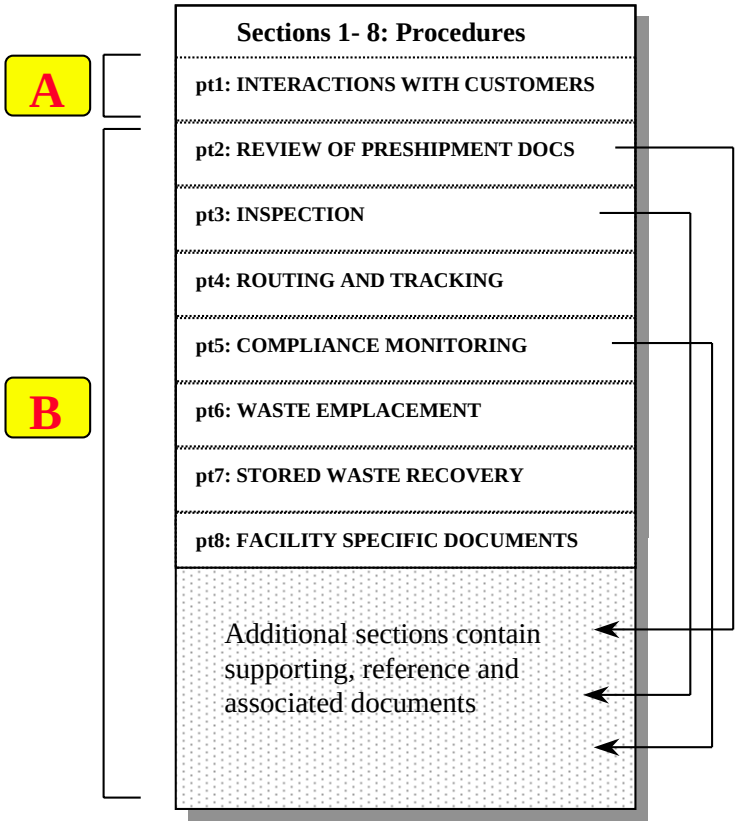
Integrated Waste Management Operating Procedures (document WMS-WMA-OP-0)



✘✓comprehensive, "**all-in-one-place**" documentation forms basis of training program and facility audits

5

The framework for accepting and managing wastes << WAS >> defined in the 1990s by the Integrated Operating Procedures (IOP).

The IOP was a suite of procedures that described activities from the first contact with a generator ("can you take my waste") up to and including its disposition in a waste repository, per the following IOP excerpt (Section 0.1):

"The purpose of this document is to ensure that all procedures for the acceptance, receipt, handling, inspection, compliance monitoring, routing, tracking emplacement into storage, recovery from storage and disposal of wastes by the Chalk River Laboratories (CRL) site are "in one place" to:

- ensure that wastes are managed in a consistent, safe and cost-effective manner according to.. ..document AECL-FA-18... ...according to the spirit and intent of.. ..RC-2000-021, Parts 2.5 and 2.6, and according to the spirit and intent of.. ..document RC-2000-124,

- provide a basis for waste management operations staff training, and

- provide a basis for environmental and operational audits of the waste management activities listed above."

The procedures in the IOP were ordered (approximately) according to the sequence that various waste management activities are performed.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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Integrated Waste Management Operating Procedures

A

Sections 1- 8: Procedures

- **pt1: INTERACTIONS WITH CUSTOMERS**
- **pt2: REVIEW OF PRESHIPMENT DOCS**
- **pt3: INSPECTION**
- **pt4: ROUTING AND TRACKING**
- **pt5: COMPLIANCE MONITORING**
- **pt6: WASTE EMPLACEMENT**
- **pt7: STORED WASTE RECOVERY**
- **pt8: FACILITY SPECIFIC DOCUMENTS**

Additional sections contain supporting, reference and associated documents

Communicating Requirements to Customers

Radioactive Wastes

✘✓ interactions with customers to facilitate acceptance

- routine wastes

✘✓ the **Waste Identification Program** A_1

- preparation and control of template data sheets

- non-routine wastes **(not part of WIDP in 1990's)**

Non-Radioactive, Hazardous Wastes

Non-Radioactive, Non-Hazardous Wastes

- Go Green
- Waste Reduction - Waste Diversion
- Waste Segregation Pilot Project

Documents Prepared and Maintained A_2

✘✓ WMS-OP-15, "Instructions for LLW Generators"

✘✓ WMS-OP-20, "Guide to Waste Mgmt Services"

✘✓ WMS-TB-1, "Guidelines for Shipping to CRL"

✘✓ standard waste data sheets

- waste package labels, ✘✓ price lists for services
- ✘ WMS-TM-35, "Qualifying Containers for Tiles"

6

This slide is the first in a series that provides details of the process for accepting and managing radwastes - it provides an overview of how WM&D communicated waste acceptance requirements to waste generators in the 1990's. A key component of IOP Section 1 is the Waste Identification (WI) program for the acceptance of routine wastes from generators (see [A1] symbol)

The next viewgraphs provide details of the WI program (look for the [A1] symbol on the slides that follow).

"abandoned or misused" noted for:

- price lists because the billing class system no longer uses the WIP-III database's autocategorization routine for assigning disposal categories

- "Instructions for LLW Generators" because its reissue in 2006 was rife with problems. In addition, WMA staff had not distributed the instructions document to generators for several years

- WMS-TB-1 was abandoned

- WMS-OP-20 was reposted on my AECL without review or acceptance by those managing the services described in the document, no one designated for its continued maintenance

- standard waste data sheets no longer had revision control, multiple versions were in use, an AA merged the structure of templates (a serious error)

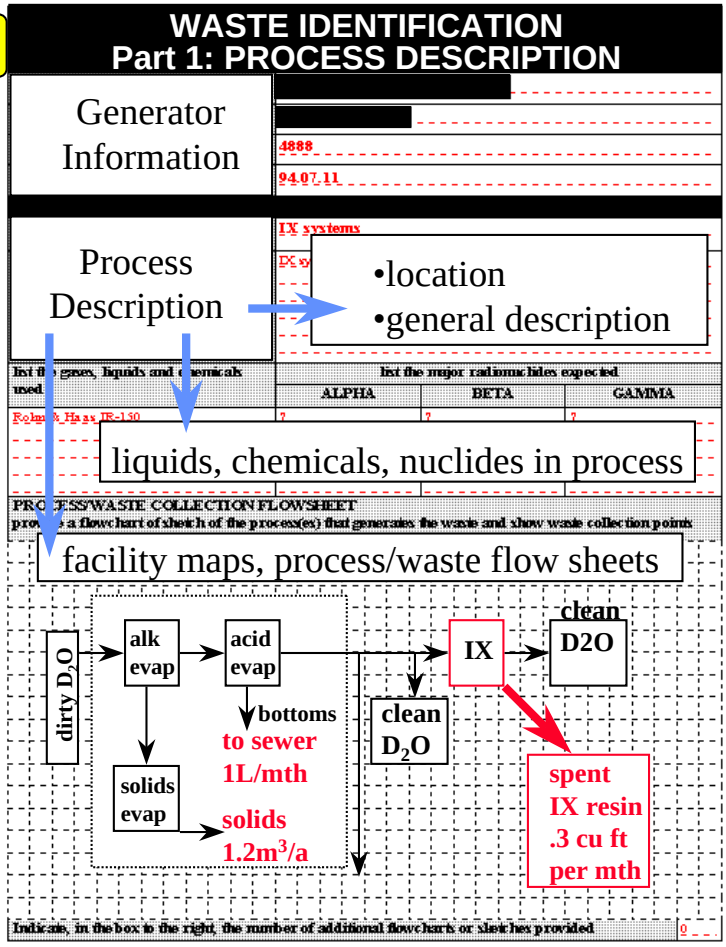
- qualification of waste containers for tile holes abandoned

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

A_1



Waste Identification Report
Process Description

Identifying what is brought into the system minimizes the list of what to look for in what leaves the system (minimize need for characterization)

7

(1) identify and characterize the processes that generate the routine radioactive wastes accepted by WM&D

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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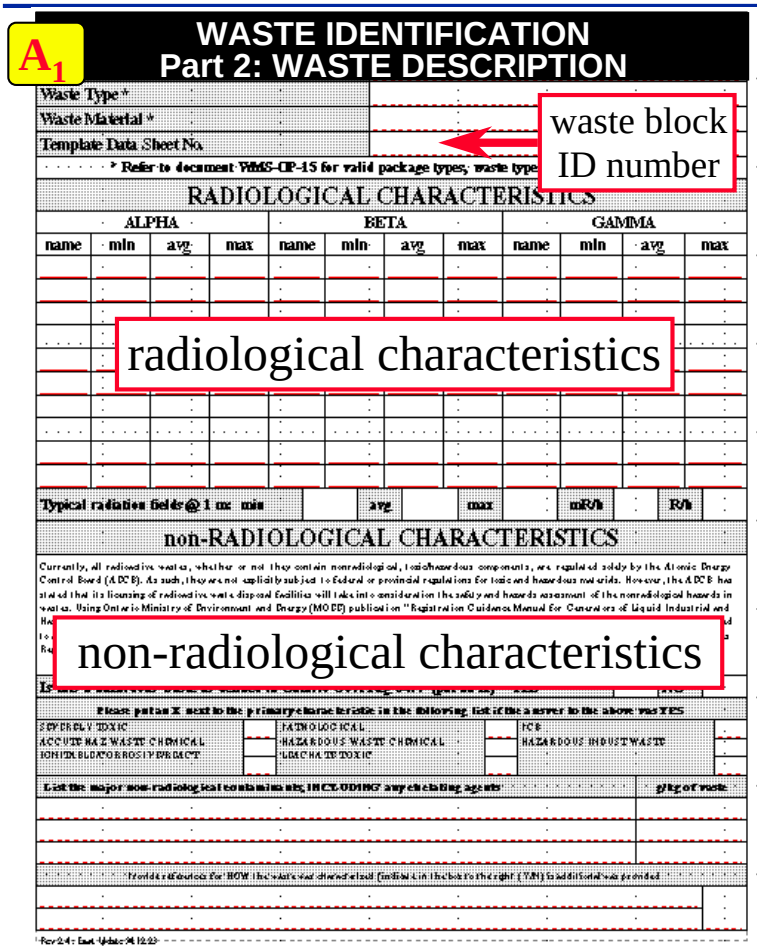


Waste Identification Report
Waste Description

waste block's average characteristics are recorded, along with details of how they were determined.

This info justifies the info entered on waste data sheets
(day-to-day transfers)

8

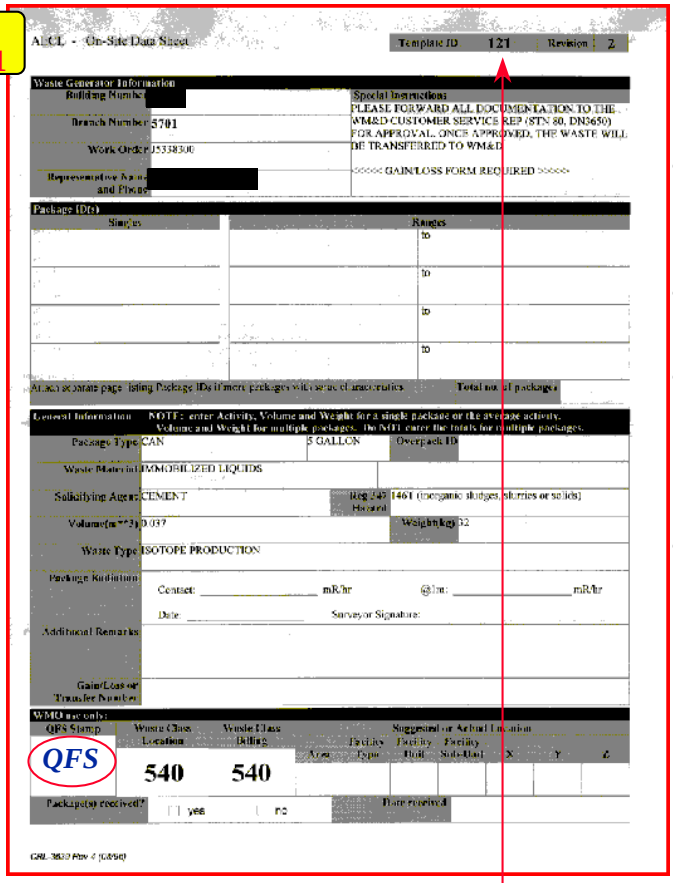
(2) identify and characterize the routine blocks of waste generated by each process or activity,

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

A_1


ALCL - On-Site Data Sheet

Template ID 121 Revision 2

Waste Generator Information

Building Number

Branch Number 5701

Work Order 15338300

Representative Name and Phone

Special Instructions: PLEASE FORWARD ALL DOCUMENTATION TO THE WM&D CUSTOMER SERVICE REP (STN 80, DN3650) FOR APPROVAL. ONCE APPROVED, THE WASTE WILL BE TRANSFERRED TO WM&D.

>>>>> GAIN/LOSS FORM REQUIRED >>>>>

Package ID(s)

Singles | Ranges

Attach separate page listing Package IDs if more packages with sequential numbers | Total number of packages

General Information NOTE: enter Activity, Volume and Weight for a single package or the average activity. Volume and Weight for multiple packages. Do NOT enter the totals for multiple packages.

Package Type CAN | 5 GALLON | Overpack ID

Waste Material IMMOBILIZED LIQUIDS

Solidifying Agent CEMENT | Reg'd? Hazard 1461 (inorganic sludges, slurries or solids)

Volume(m**3) 0.037 | Weight(kg) 62

Waste Type ISOTOPE PRODUCTION

Package Radiation Contact: _____ mR/hr @1m: _____ mR/hr

Date _____ Surveyor Signature:

Additional Remarks

Gain/Loss or Transfer Number

WMO use only:

QFS Stamp	Waste Class Location	Waste Class Billing	Suggested or Actual Location: Area	Facility Type	Facility Unit	Facility Sub-Unit	X	Y	Z
QFS	540	540							

Package(s) received? ☐ yes ☐ no | Date received

GRL 3639 Rev 4 (08/06)

Waste Data Sheet

- **preshipment copies completed by generators (record waste characteristics)**
- **reviewed by WM&D: approval = QFS**
- **based on waste identification reports, ✘✓ WIP-III creates pre-filled data sheet templates (more detail later in presentation)**
- **templates:**
  - **reduce generator education**
  - **reduce generator effort**
  - **simplify the QFS process**
  - **link waste to process/activity**

same ID# is recorded in waste identification report

9

(3) prepare customized, template data sheets for each routine waste block

"abandoned or misused" cited because *ad hoc* templates (not based in the waste identification program) were created from 2000-2006 and generators were allowed to modify templates for individual transfers. In addition, without oversight by waste management staff, generators sometimes used the wrong templates for waste transfers.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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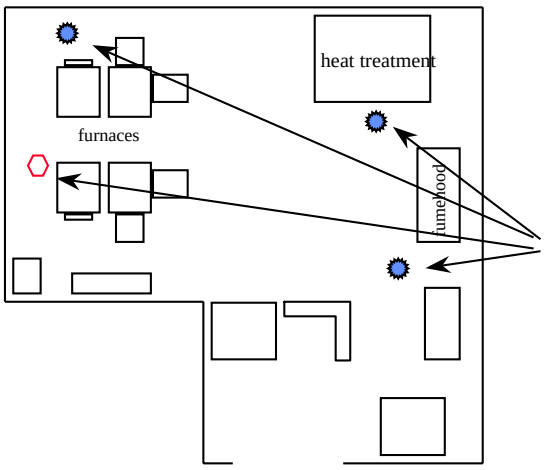
A_1



✘✓Waste collection points are identified and mapped within the generator's workplace

10

(4) ensure generators "use the right piece of paper with the right waste" when they transfer waste to WM&D - that is they use the correct template data sheets to transfer routine wastes, by:

- **identifying and marking waste collection points in the generator's facility,**
- ensuring that generators implement effective waste collection/segregation procedures,
- implementing standard procedures to transfer waste to WM&D, and
- auditing waste collection and segregation within a generator's facility.

"abandoned or misused" cited because waste management staff did not provide oversight resulting in collection point signs taken down or generators did not know their purpose.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

A_1

Procedures for Transferring Radioactive Wastes from the [redacted] to the CRL Waste Receiver

Background Information

Both routine and non-routine wastes may be accepted by the group responsible for waste management at CRL. Routine wastes are those identified by the following waste management plan for the ERF:

- WM&D-WMO-00430-WPN-EC524-1 (current revision)

Routine wastes are:

- identified as "blocks" by the waste receiver,
- assigned a block number by the waste receiver, and
- assigned a customized waste data sheet (template), which contains the block number.

Any waste not identified by the waste management plan listed above is considered a non-routine waste.

Procedures

1. Routine Waste Blocks

1.1 Marking Routine Wastes with the Block Numbers from Their Assigned Templates

1.1.1 Prior to collecting a routine waste block in the package that is specified on its assigned template, the package shall be labelled with the waste block number that is specified on its assigned template, except as specified in paragraphs 1.1.1.2 and 1.1.1.3, below.

1.1.1.1 For example, if waste block 641 is collected in a 5 gallon can, the 5 gallon can shall be labelled "block 641" prior to collecting waste in the can.

1.1.1.2 For cases where a package is not used to collect the waste, for example HEPA filters, the item that will become the waste shall be labelled with the block number that is specified on its assigned template.

1.1.1.3 For cases where a routine waste block is collected in trash cans lined with plastic bags, BOTH the plastic bag that lines the can and the trash can shall be labelled with the block number that is on the waste block's assigned template

Page 1 of 3

✘✓ standard waste transfer procedure

11

(4) ensure generators "use the right piece of paper with the right waste" when they transfer waste to WM&D - that is they use the correct template data sheets to transfer routine wastes, by:

- identifying and marking waste collection points in the generator's facility,
- ensuring that generators implement effective waste collection/segregation procedures,
- **implementing standard procedures to transfer waste to WM&D**, and
- auditing waste collection and segregation within a generator's facility.

"abandoned or misused" cited because waste management staff did not provide oversight oversight resulting in transfer signs taken down or generators did not know their purpose.

see notes pages for more info

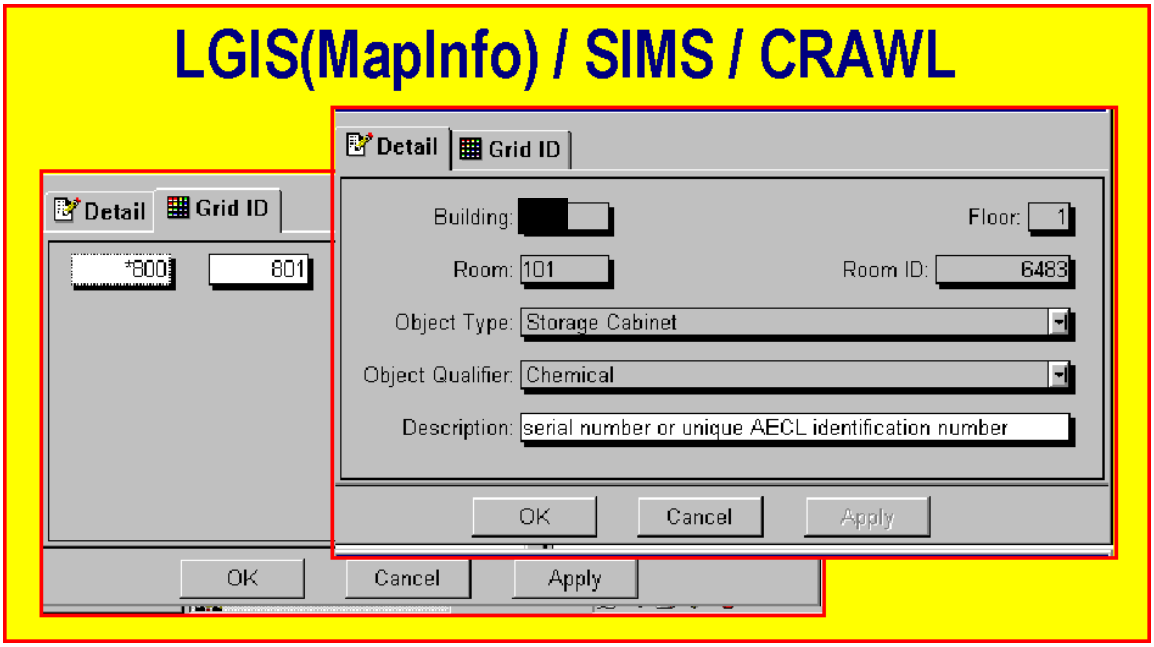
Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

A_1

✘✓Audit process

- map waste collection points in generator's facility
- check that wastes are collected as specified by the generator (where and how)
- demonstrates to the regulator that "front-end controls" are in place to ensure that generators manage wastes according to their waste management plans.



12

(4) ensure generators "use the right piece of paper with the right waste" when they transfer waste to WM&D - that is they use the correct template data sheets to transfer routine wastes, by:

- identifying and marking waste collection points in the generator's facility,
- ensuring that generators implement effective waste collection/segregation procedures,
- implementing standard procedures to transfer waste to WM&D, and
- **auditing waste collection and segregation within a generator's facility.**

Mapping of collection points with WIP/CRAWL was abandoned by waste management operations. With the replacement of the LGIS by the Facility Information System, the mapping functionality was lost.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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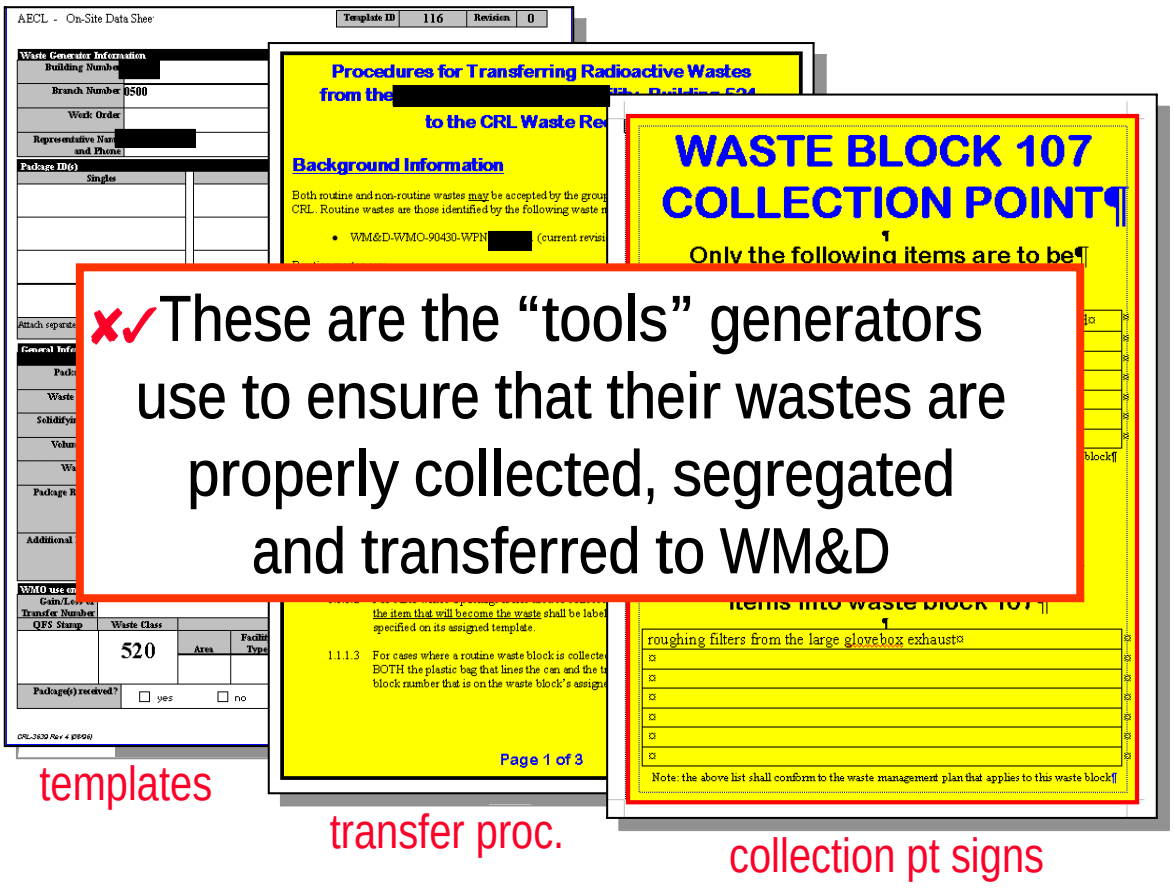
A_1



✘✓These are the "tools" generators use to ensure that their wastes are properly collected, segregated and transferred to WM&D

templates

transfer proc.

collection pt signs

13

This slide ties the previous slides together conceptually. The loss and/or misuse of the tools had a negative impact on the effective front end management of wastes (pre-acceptance by waste management operations).

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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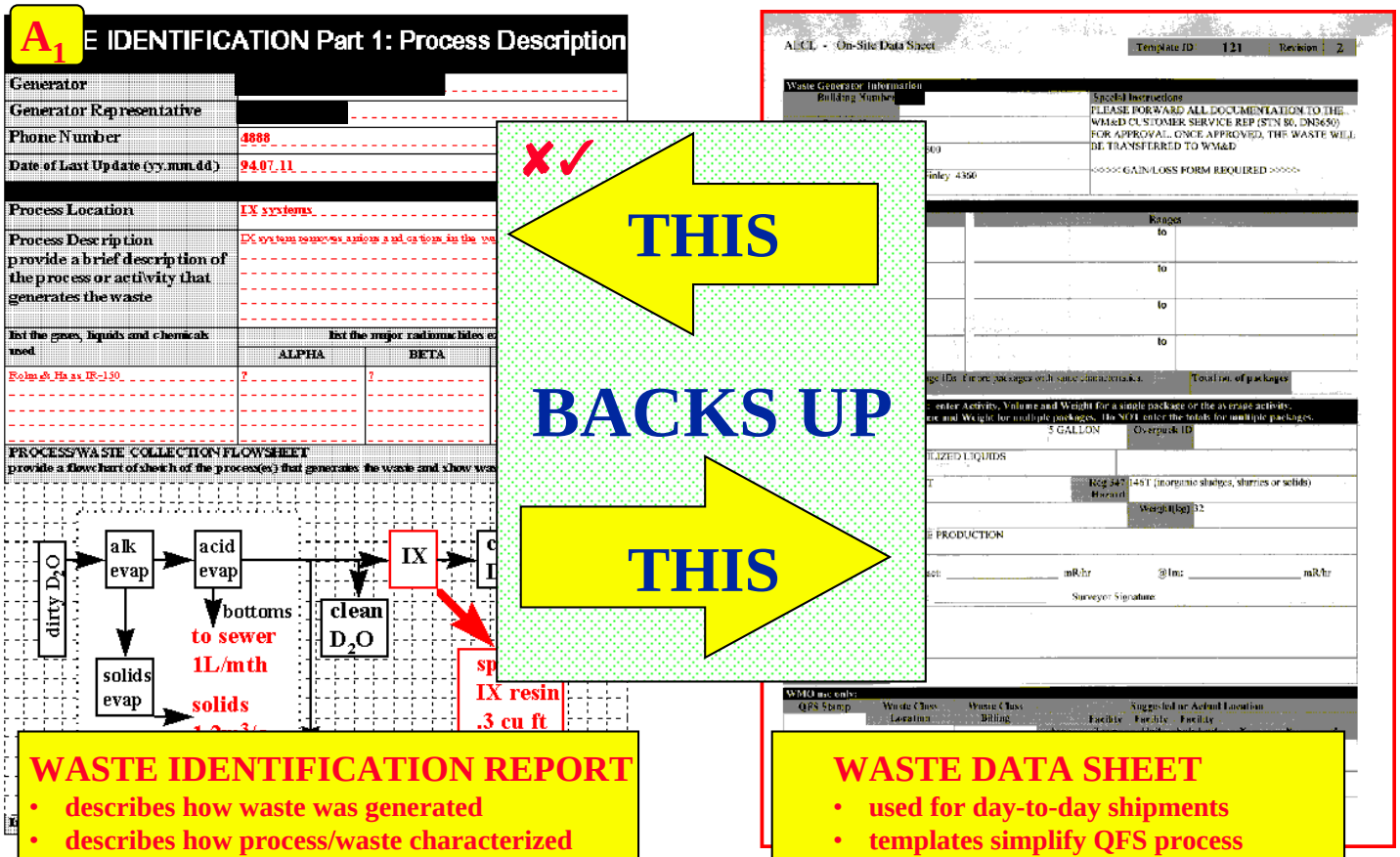


WASTE IDENTIFICATION REPORT

- describes how waste was generated
- describes how process/waste characterized
- describes average waste characteristics

WASTE DATA SHEET

- used for day-to-day shipments
- templates simplify QFS process
- linked to WI report by ID number

14

This slide illustrates the relationship between waste identification reports and template (pre-filled) data sheets, which are used by generators to transfer their wastes to WM&D.

"abandoned or misused" cited because *ad hoc* templates (not based in the waste identification program) were created from 2000-2006 and generators were allowed to modify templates for individual transfers. In addition, without oversight by waste management staff, generators used the wrong templates for some waste transfers.

REFERENCE

G.W. Csullog, N.W. Edwards and M.A.. terHuurne, “The Waste Identification Program at Atomic Energy of Canada Limited’s Chalk River Laboratories”, Third International Seminar on Radioactive Waste Products, 23-26 June 1997, Wurzburg, Germany.

Acrobat Document

copy of above reference (embedded Adobe PDF file)

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

Integrated Waste Management Operating Procedures

B

Sections 1- 8: Procedures

- pt1: INTERACTIONS WITH CUSTOMERS
- pt2: REVIEW OF PRESHIPMENT DOCS
- pt3: INSPECTION
- pt4: ROUTING AND TRACKING
- pt5: COMPLIANCE MONITORING
- pt6: WASTE EMPLACEMENT
- pt7: STORED WASTE RECOVERY
- pt8: FACILITY SPECIFIC DOCUMENTS

Additional sections contain supporting, reference and associated documents

Qualification of Waste for Acceptance

✘✓ addresses AECB request for formal procedures for accepting wastes (part of AECB review of AECL-MISC-295 Rev 2)

Review of waste data sheets that are completed by waste generators and the ***assignment of a waste class***. ✘✓

Waste Class
- determines storage and disposal option
- sets cost of waste management services rendered
- information entered into WIP-III database **B_1**

Documents Prepared and Maintained
- complete WIP-III documentation
  - feasibility study, mandate definition,
  - quality assurance and testing
  - user manuals, system documentation, etc.
- non-conformance report forms ✘✓
- WMS-OP-17, "WMA Radiolog Accept Criteria"

Remember: The use of template data sheets simplifies the process for accepting wastes (and, thus, reduces the costs associated with this activity)

16

This slide describes Section 2 of the IOP.

A key component of waste acceptance is the Waste Inventory Programs, version III (WIP-III), which is the subject of the next series of slides.

The slide indicates that AECL abandoned procedures requested by the AECB (now CNSC) to support IRUS operation. The disposal autocategorization routine in WIP-III was not maintained – that means that AECL lacks a defensible mechanism for assigning billing classes. That, in turn, means that charge backs to generators are not defensible and estimating disposal requirements based on containment needed (by disposal class) is not defensible (inadequate for planning).

Non-conformance reporting via WIP-III, a key mechanism for process improvement, was abandoned.

see notes pages for more info

B_1

Objectives of WIP-III

- ✓ higher quantity/quality of data entered with less effort and fewer staff,
- ✓ minimize training to complete waste data sheets properly,
- ✓ minimize waste generator effort for filling out waste data sheets,
- ✓ minimize effort by WM&D to qualify wastes for shipment (QFS),
- ✘✓ integrate inspection & compliance monitoring data with waste receipt data...

17

With the advent of cutbacks in Federal Government funding, starting in the mid 1980's, it became clear that WM&D had to work smarter, better, faster at the same time that resources were diminishing.

WIP-III, envisioned in the late 1980's, was developed to provide an "administrative system" in support of waste management operations to ensure that operations were carried out cost-effectively without compromising safety or environmental protection (we had to do better with less)

This slide, and the next, describe the objectives set for WIP-III development.

B_1

Objectives of WIP-III (cont'd)

- ✘✓ automate non-conformance and corrective actions reporting,
- ✓ link to financial system to minimize the effort and cost of invoicing, and
- ✓ minimize the effort for reporting to internal and external customers.

see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

Full integration of WIP-III with day-to-day operations assures:

✘✓ **minimization of effort and costs associated with**
- ✘✓ ***defensible*** **waste acceptance (not rubber stamping),**
- ✘✓ **inspection and compliance monitoring,**
- ✘✓ **package tracking (i.e., transfers from storage to disposal),**
- ✘✓ ***defensible*** **invoicing customers (billing class assignment), and**
- ✘✓ ***defensible*** **waste inventory control (not just "put it there")**

✘✓ **Continuous Quality Improvement of waste operations via automated non-conformance reporting and corrective actions**

✘✓ **consistent and accurate reporting to mgmt. and regulator**

19

Problems with "QFSing" waste (WMA staff not trained or qualified), acceptance almost a rubber stamping exercise. An ImpAct submitted in Sept 2007.

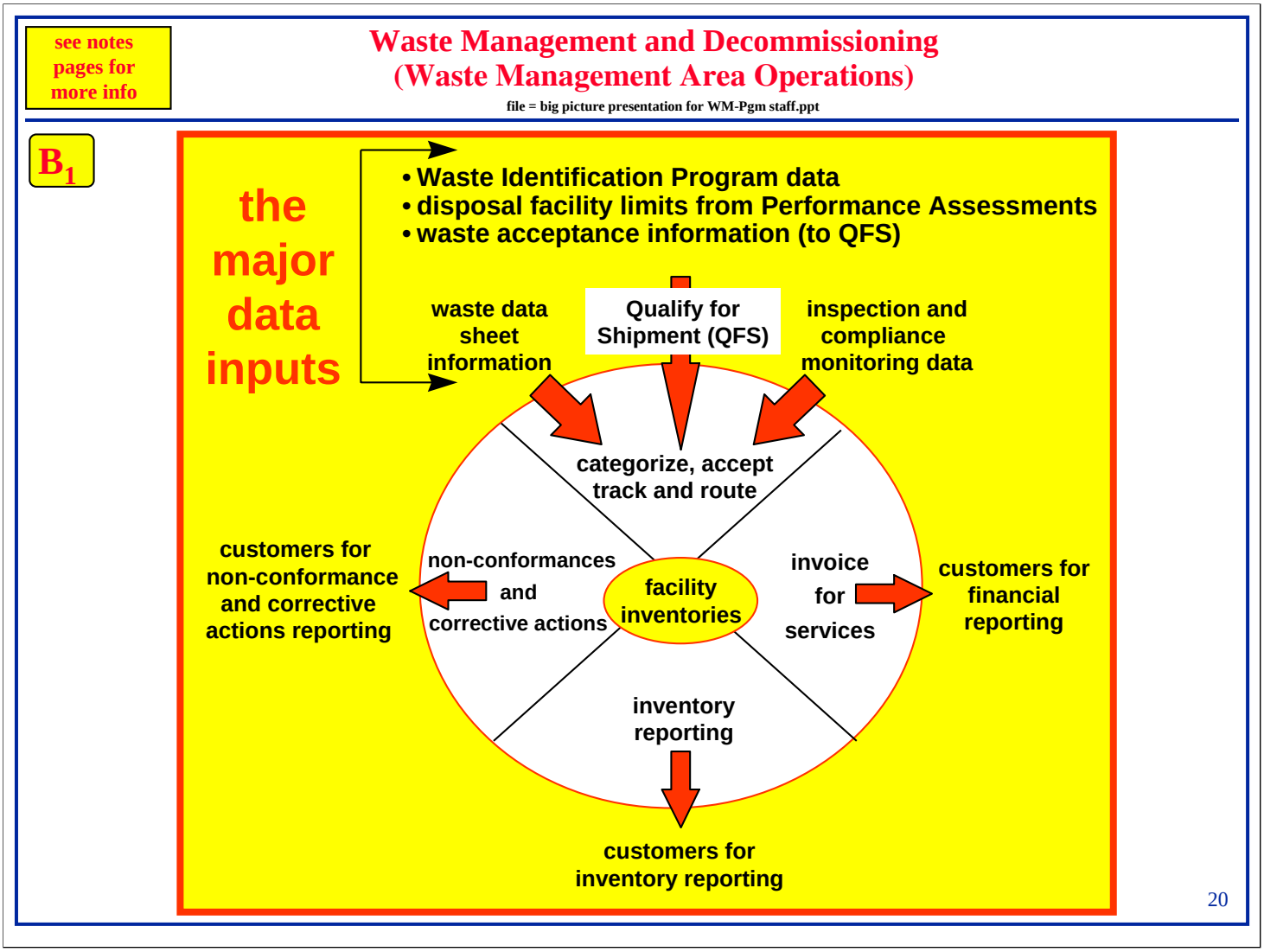
Problems with inspection and compliance monitoring identified. WIP-III modules not used, procedures not followed. An ImpAct submitted in Sept 2007. In addition, management was notified that statements about inspection and compliance monitoring in SMAGS safety case were wrong (WMA staff were not doing waste statements claimed).

Problems with waste package tracking were noted. An ImpAct submitted in Sept 2007.

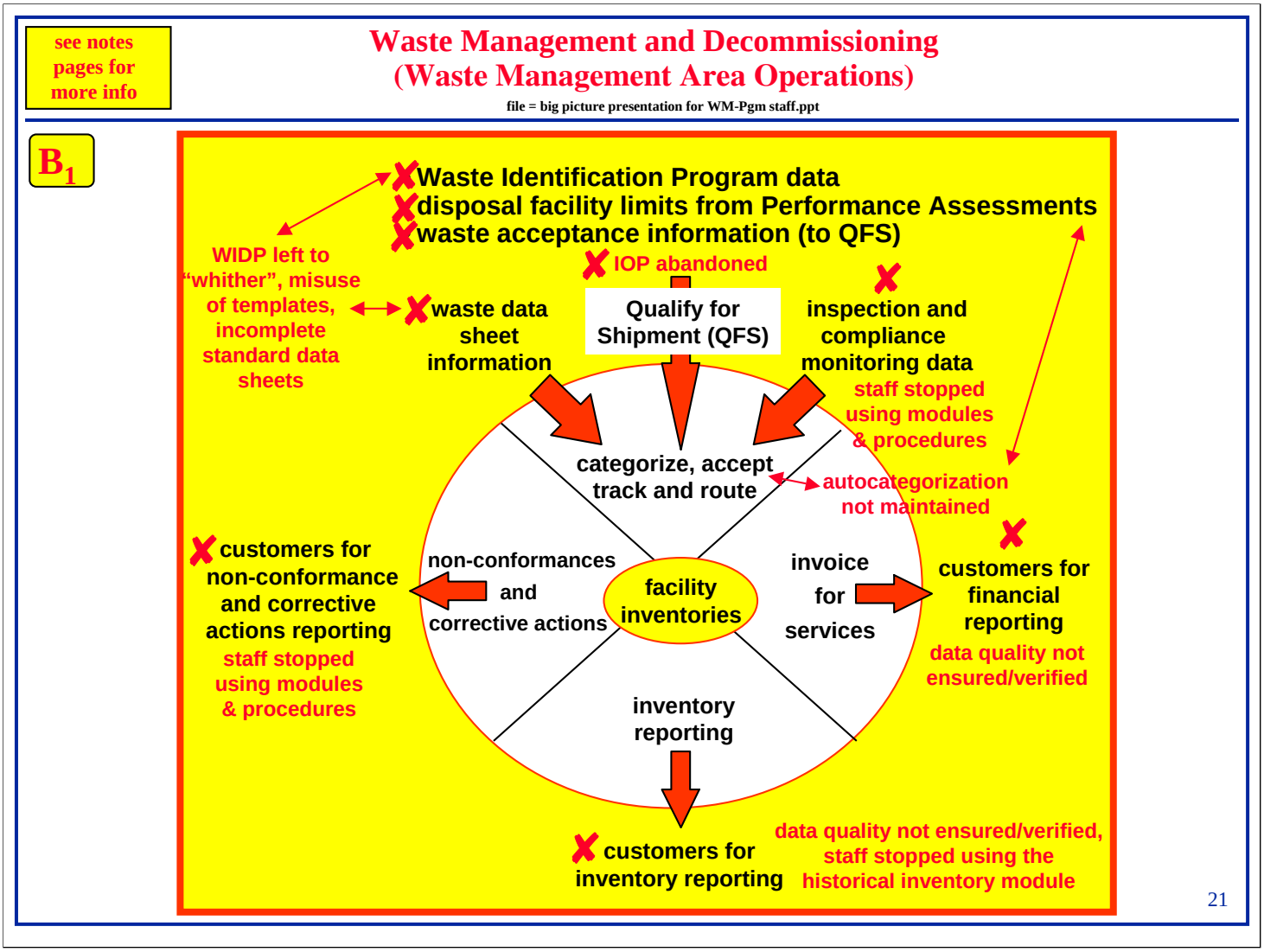
Problems with billing class assignments were noted. An ImpAct submitted in Sept 2007.

Problems with dispositioning noted. An ImpAct submitted in Sept 2007.

As of Jan 2010, to my knowledge, none of the issues cited in ImpActs have been effectively dealt with (or addressed at all). This is in the context of a waste management improvement initiative. Where are the improvements in day to day operations?



This slide shows a high level conceptualization of WIP-III integration with day-to-day waste management activities. It represents what was successfully implemented in 1997.



This slide shows a high level conceptualization of WIP-III integration with day-to-day waste management activities. It shows the status of WIP in early 2006 (no significant changes as of Jan 2010).

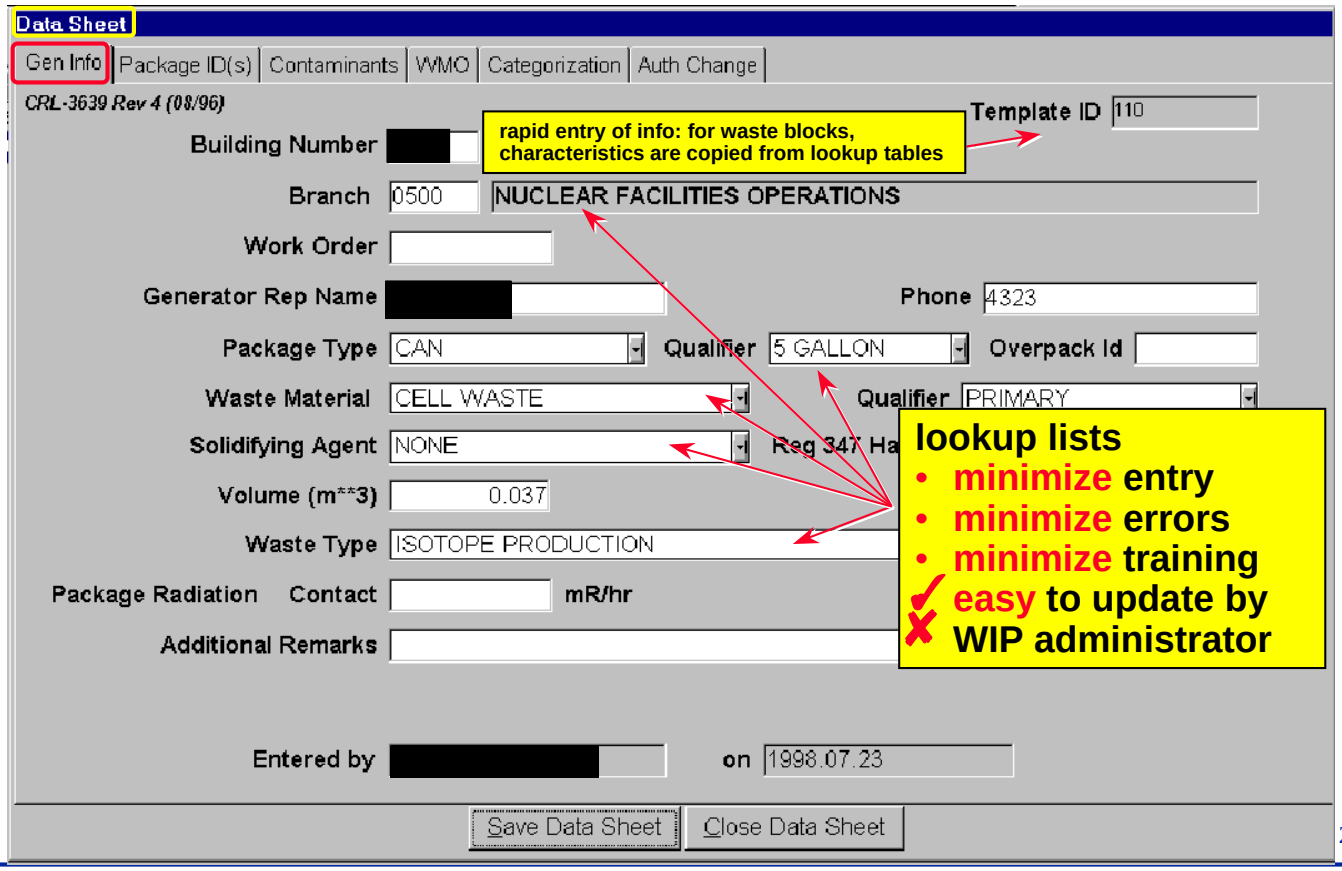
see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

WIP-III is designed for maximum efficiency



22

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - recording of waste characteristics is shown here.

Without a designated WIP-III administrator, ad hoc template waste data sheets were prepared and not based on waste identification program data. In addition, changes were made to look up lists, like removing all Reg 347 contaminants, with no apparent oversight or formal authorization.

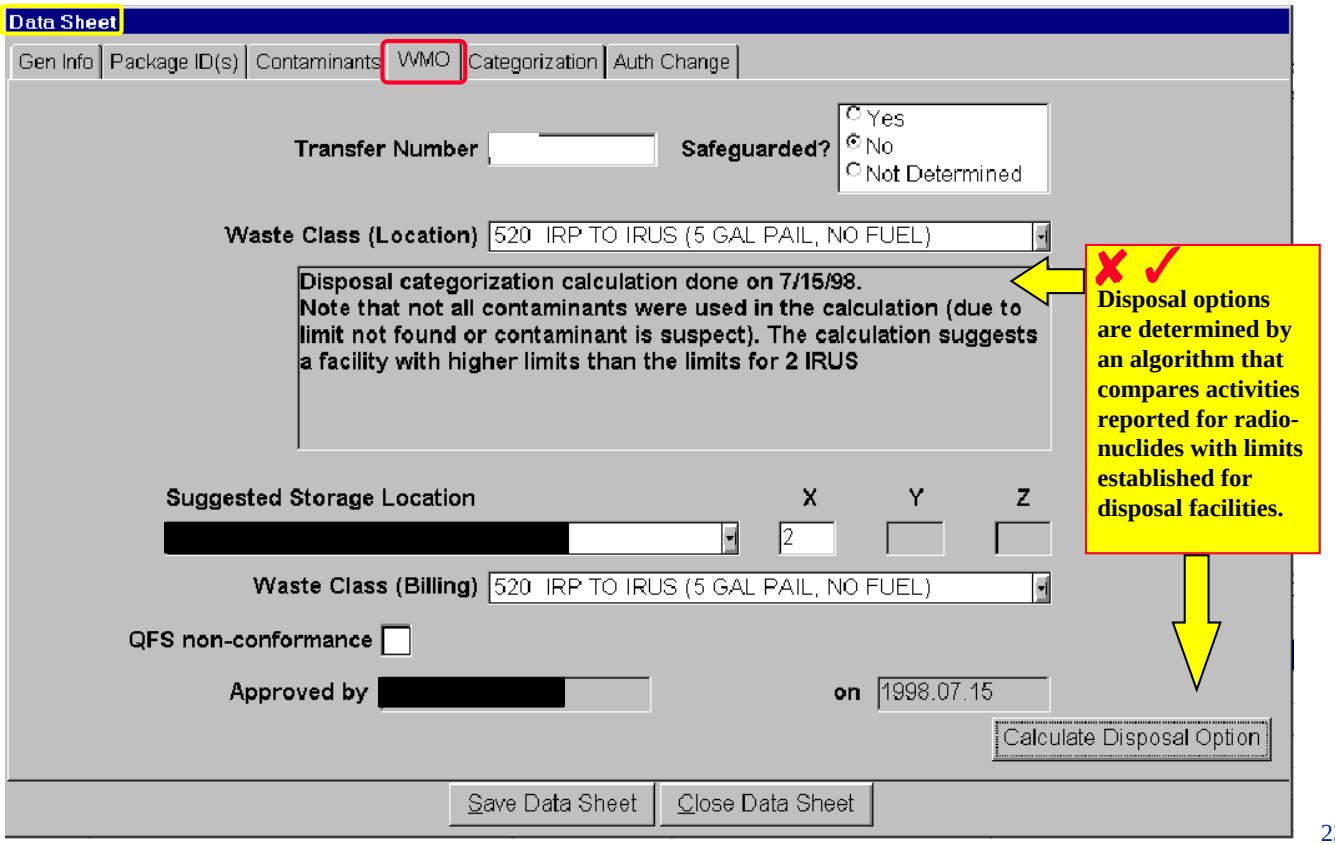
see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

WIP-III is designed for maximum efficiency



✘ ✓ **Disposal options are determined by an algorithm that compares activities reported for radio-nuclides with limits established for disposal facilities.**

23

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - recording of waste classification and location is shown here.

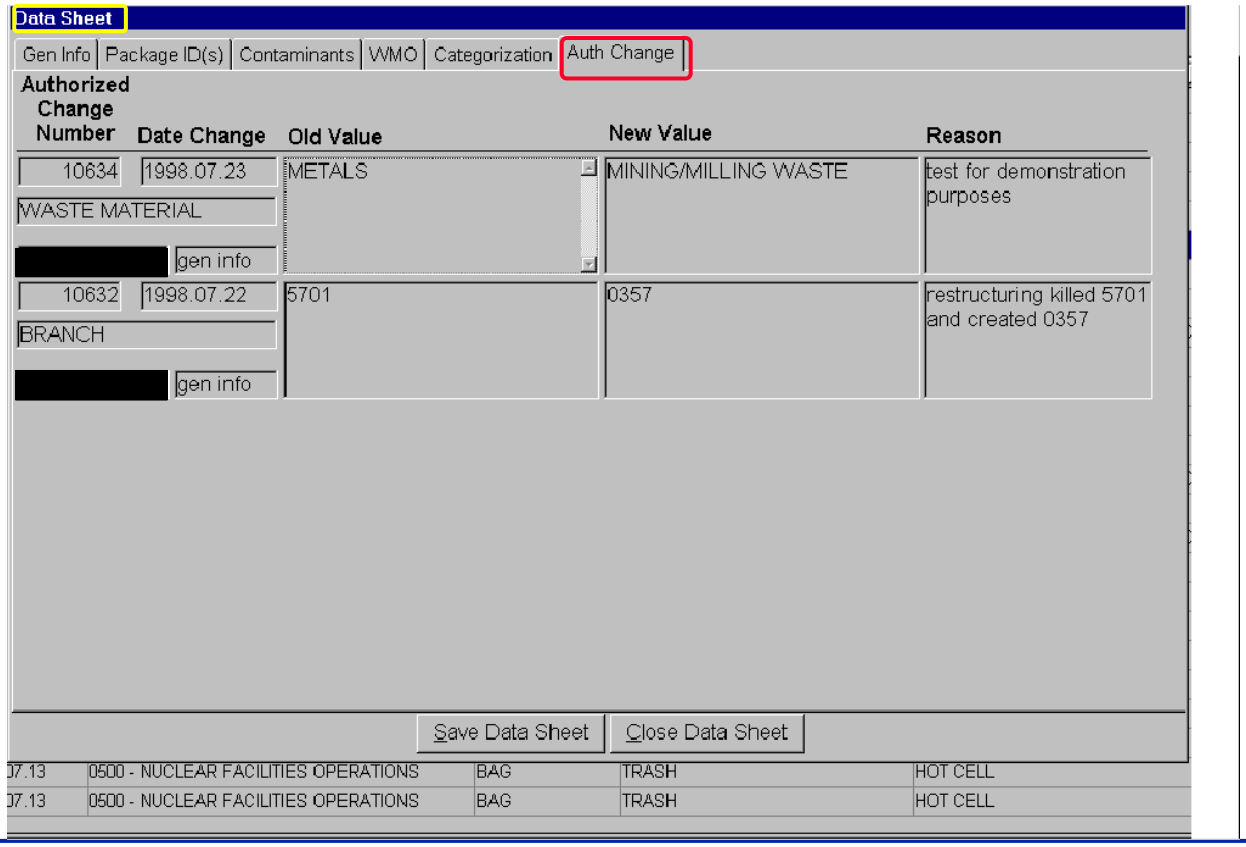
Limits for nuclides were not maintained and WMA staff stopped categorizing waste for disposal based on the WIP-III algorithm. As a reminder, the following is from slide 16

The disposal autocategorization routine in WIP-III was not maintained – that means that AECL lacks a defensible mechanism for assigning billing classes. That, in turn, means that charge backs to generators are not defensible and estimating disposal requirements based on containment needed (by disposal class) is not defensible (inadequate for planning).

see notes pages for more info

B_1

WIP-III tracks changes to ensure data integrity



24

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - ensuring data integrity is shown here. This feature was instrumental in tracking down why U-235 was selectively removed from the template for baled waste from the waste treatment centre.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

WIP-III tracks processes that generate routine waste

Waste Process List

Process ID	Generator	Site	Building	Room
548	6101 - ISOTOPE SUPPLY BRANCH	CRL	[redacted]	see waste mgmt plan
571	6101 - ISOTOPE SUPPLY BRANCH	CRL		see waste mgmt plan
572	6101 - ISOTOPE SUPPLY BRANCH	CRL		see waste mgmt plan
750	0500 - NUCLEAR FACILITIES OPERATIONS	CRL		see waste mgmt plan
1034	0500 - NUCLEAR FACILITIES OPERATIONS	CRL		see waste mgmt plan
1098	0500 - NUCLEAR FACILITIES OPERATIONS	CRL		see waste mgmt plan
1247	6302 - NRX OPERATIONS	CRL		not applicable
1252	6302 - NRX OPERATIONS	CRL		rod bay
1413	4701 - RADIATION BIOLOGY AND HEALTH PHYS	CRL		see waste mgmt plan
1824	4825 - WASTE MANAGEMENT OPERATIONS	CRL		not applicable
2421	4825 - WASTE MANAGEMENT OPERATIONS	CRL	N/A	what if scenarios
2614	3201 - FUEL DEVELOPMENT	CRL	[redacted]	see waste mgmt plan
2664	4825 - WASTE MANAGEMENT OPERATIONS	CRL	WMA	N/A
3036	THE CANADIAN RED CROSS	Alta Vista Rd, Ottawa	N/A	see waste ID report
3046	NATIONAL RESEARCH COUNCIL CANADA	Institute for Bio Scien	N/A	see waste ID report
3913	0901 - GENERAL CHEMISTRY	CRL	[redacted]	see waste mgmt plan
5816	THE CANADIAN RED CROSS SOCIETY	Plymouth Rd, Ottawa	N/A	see waste ID report
10187	CARLETON UNIVERSITY	Ottawa Campus	N/A	see waste ID report
10239	5701 - PRODUCTION SERVICES	CRL	[redacted]	see waste ID report
10289	CANADIAN FOOD INSPECTION AGENCY	Fallowfield Road, Otta	N/A	see waste ID report
10579	MDS NORDION	Kanata	N/A	see waste ID report

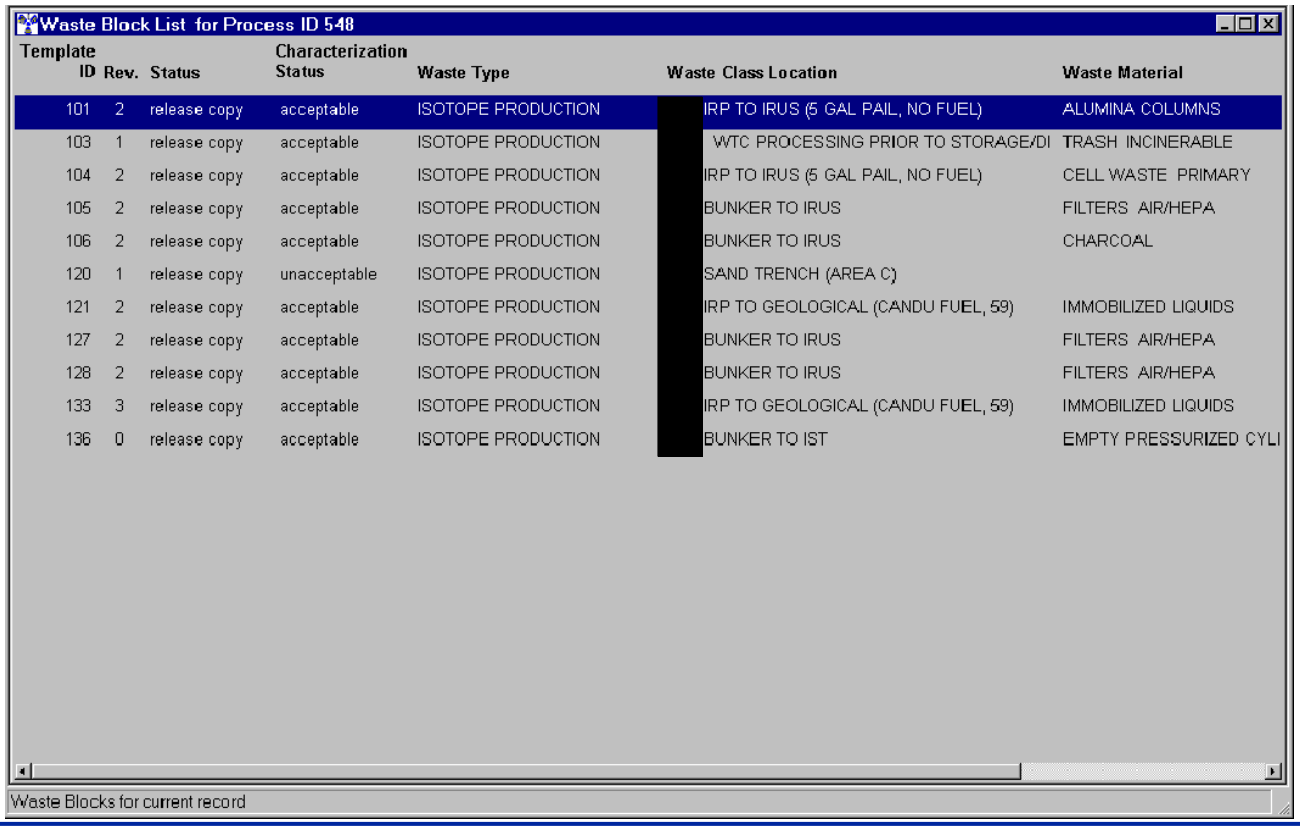
Ready

25

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - tracking of the processes that generate routine wastes is shown here.

see notes pages for more info

B_1 WIP-III tracks routine wastes ("blocks") from processes



This slide illustrates how WIP-III is integrated with day-to-day waste management operations - tracking of the routine waste blocks that are generated by processes is shown here.

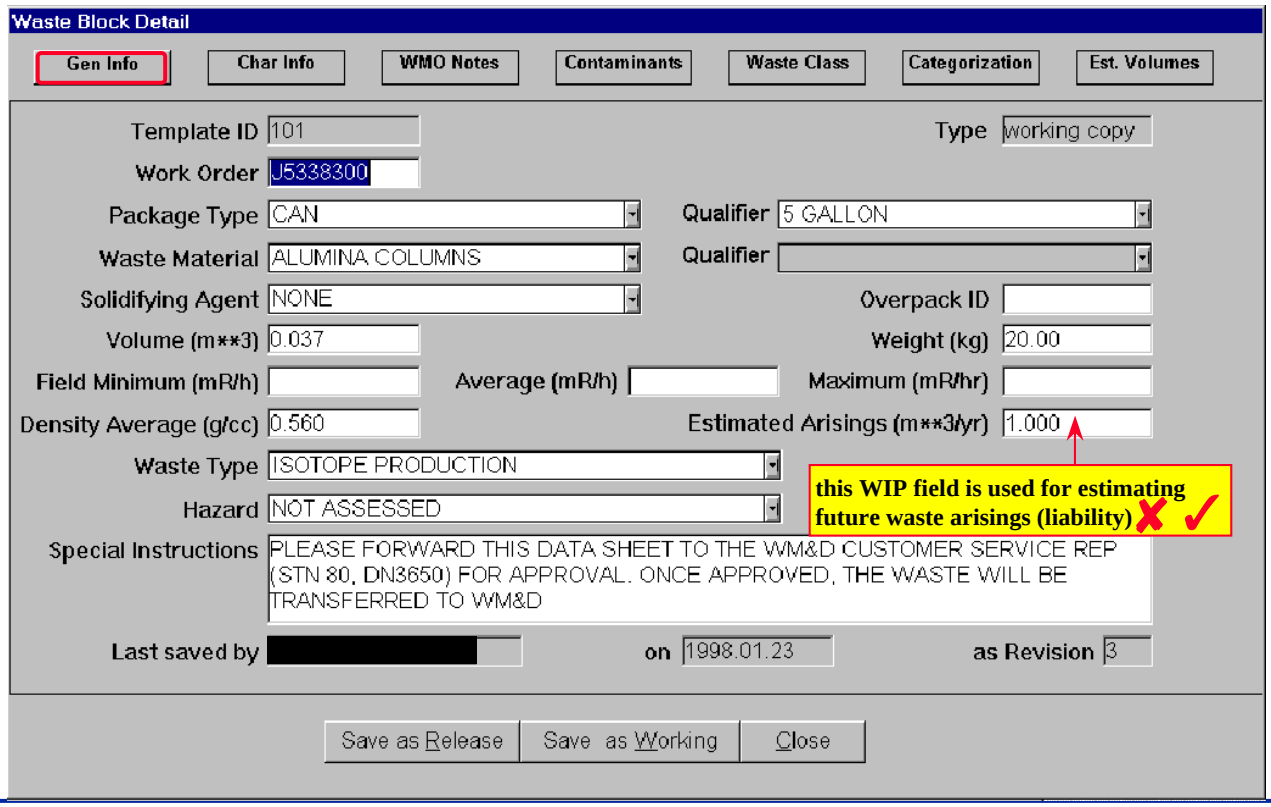
see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

WIP-III records the average characteristics of waste blocks
(the information derives from Waste Identification Reports)



27

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - recording the characteristics of routine waste blocks that are generated by processes is shown here.

X indicates that D&WM manager were not aware of the ability of WIP-III to forecast future waste arisings. Even when awareness was raised, WIP-III's ability to forecast future arisings was not acknowledged in plans to improve waste management information systems. Instead, a forecasting database was proposed. The perceived lack of forecasting, or the inability to recognize WIP-III's forecasting features, was even cited as a reason for WMA staff not dispositioning wastes defensibly (how those concept were linked is baffling).

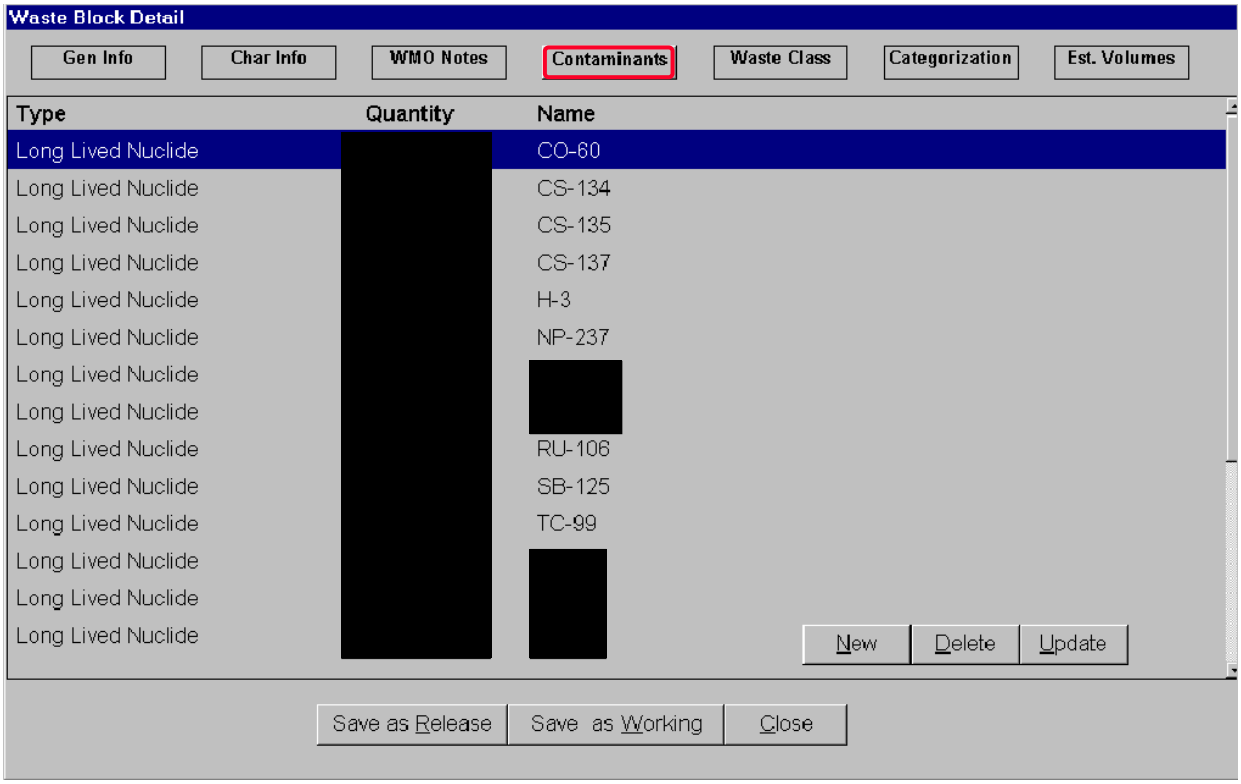
see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

WIP-III records the average characteristics of waste blocks (the information derives from Waste Identification Reports)



28

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - recording the characteristics of routine waste blocks that are generated by processes is shown here.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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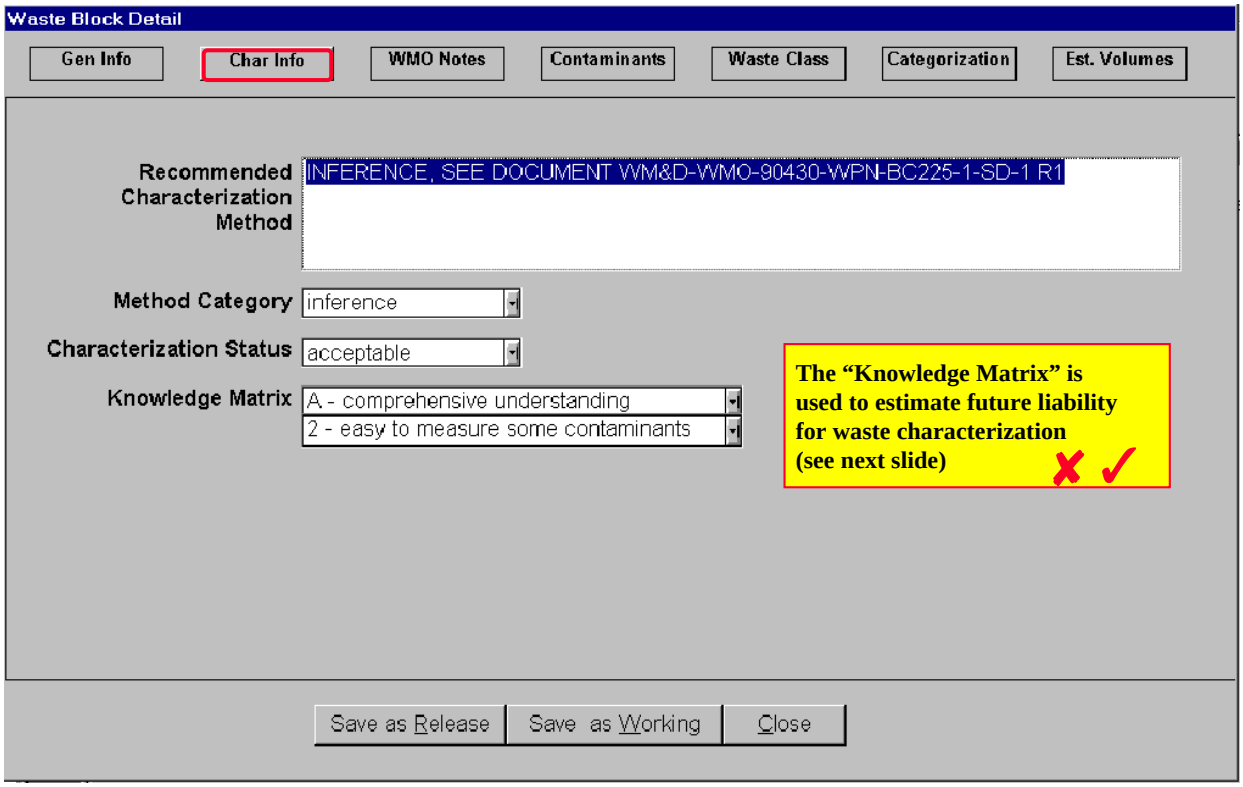
B_1

WIP-III links waste blocks characteristics to supporting documentation (reduces effort to track down 'paperwork')



29

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - the linking of documentation that describes how the characteristics of routine waste blocks were determined is shown here.

X indicates that staff stopped updating the information, therefore the feature stopped being useful (if maintained, it can regain its usefulness). This is another case of D&WM management not knowing or understanding WIP-III's usefulness for future planning. Revival and maintenance of WIP-III's forecasting features puts into doubt the need to develop a "new system" for forecasting.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

WIP-III's "Knowledge Matrix" is used to estimate the possible future liability for waste characterization

✘ ✓	Waste Management Knowledge Matrix	A comprehensive understanding of processes/activities and of how wastes are contaminated	B partial understanding of processes/activities and of how wastes are contaminated	C limited understanding of processes/activities and of how wastes are contaminated
1	one or more easy to measure contaminants can be used to estimate most/all other contaminants	A1 relatively inexpensive to characterize **($$)**	B1	C1
2	one or more easy to measure contaminants can be used to estimate some other contaminants	A2	B2	C2
3	no easy to measure contaminants can be used to estimate other contaminants	A3	B3	C3 relatively expensive to characterize **($$$$$$)**

30

This slide illustrates how WIP-III is also use for planning future work - assessing possible future liabilities associated with waste characterization (see previous) slide, uses the "knowledge matrix".

When costs are estimated for matrix values (A1 to C3), WIP-III can be used to estimate future waste characterization costs for the various wastes that are managed by AECL

see notes pages for more info

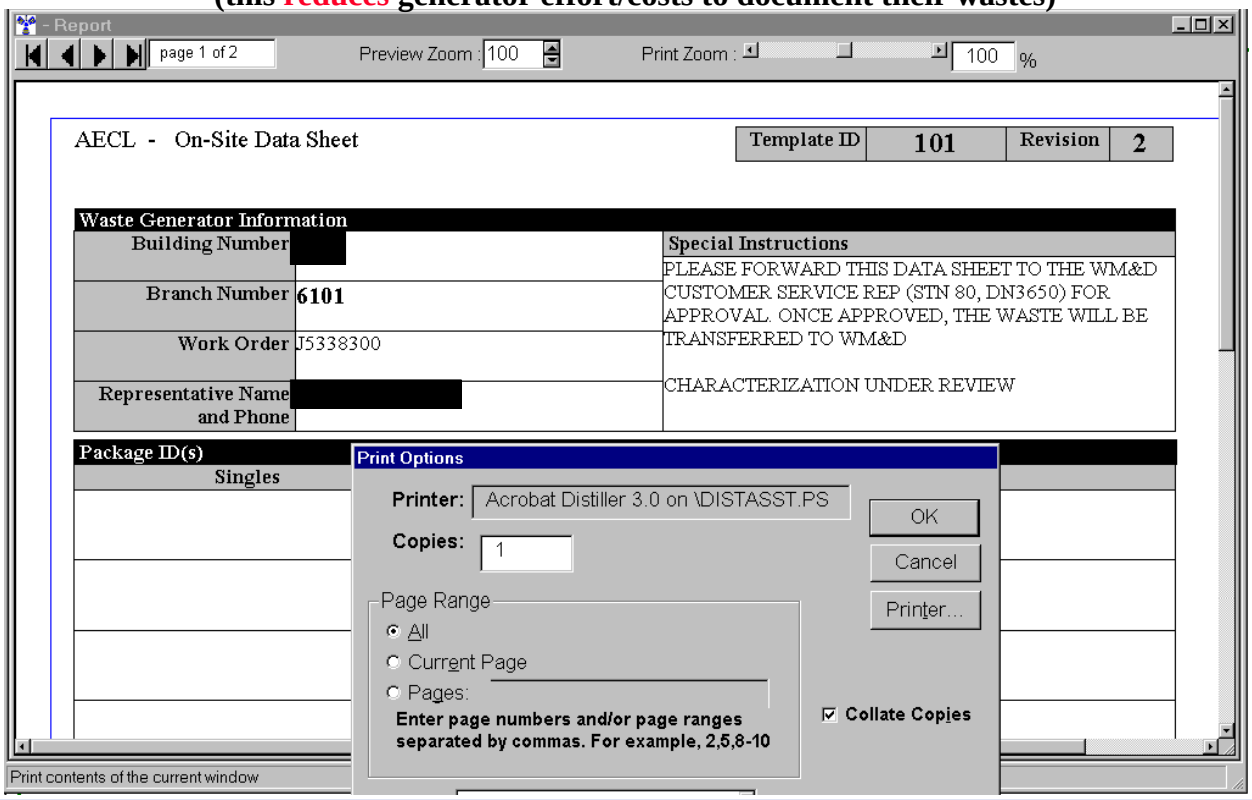
Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

WIP-III even prints the "paperwork" for generators to use when transferring wastes to WM&D

(this reduces generator effort/costs to document their wastes)



31

This slide illustrates yet another cost saving measure associated with WIP-III

Note: The input of waste identification program from waste management plans (WMP) and waste identification reports (WIR) to generate template waste data sheets was not identified as a component of the proposed integrated waste management information system. It is unclear how data can be effectively managed and "paperwork" effectively controlled without integrating WMP/WIR data within WIP-III to control data flow.

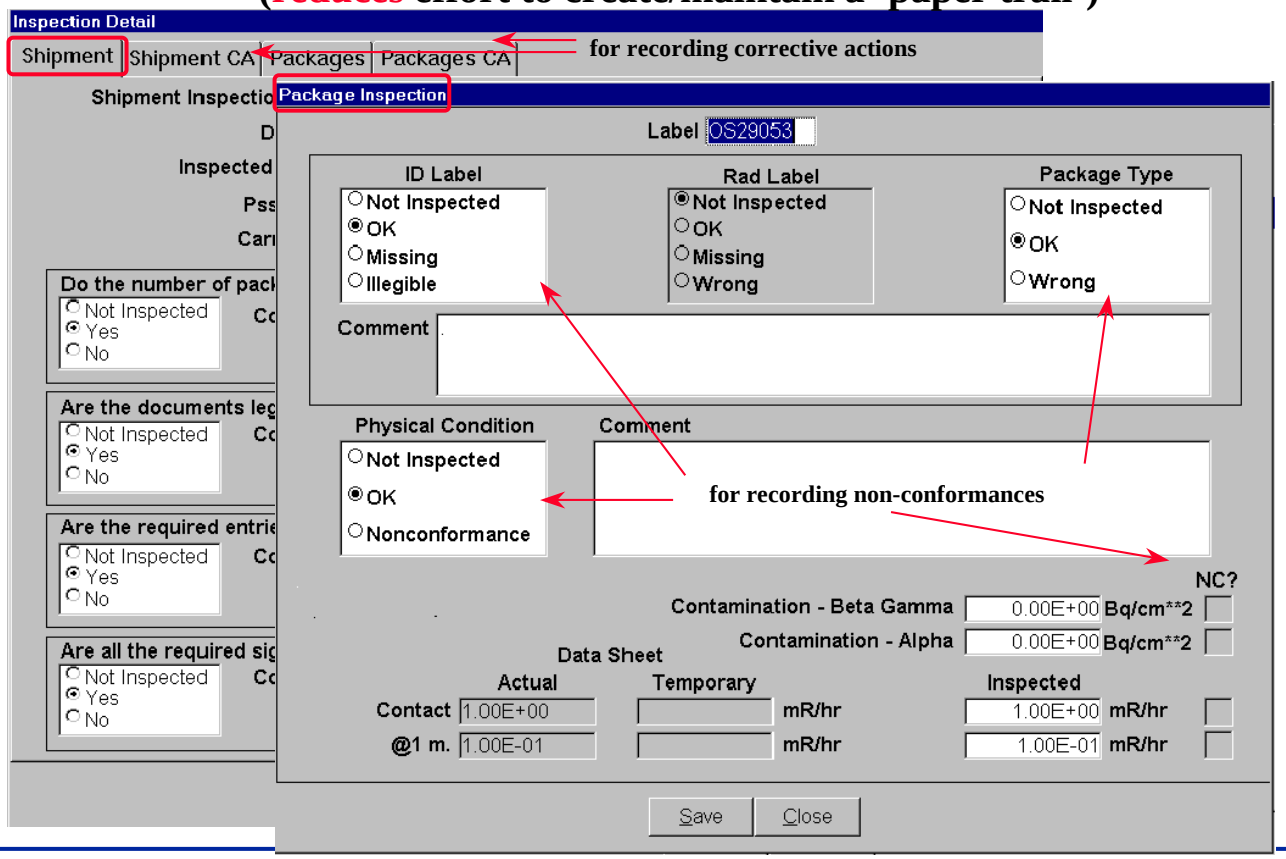
see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B1

✘ ✓Waste Inspection is an integrated WIP-III function (reduces effort to create/maintain a 'paper trail')



32

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - the recording of waste inspection information is shown here.

WMA staff stopped using this WIP-III module

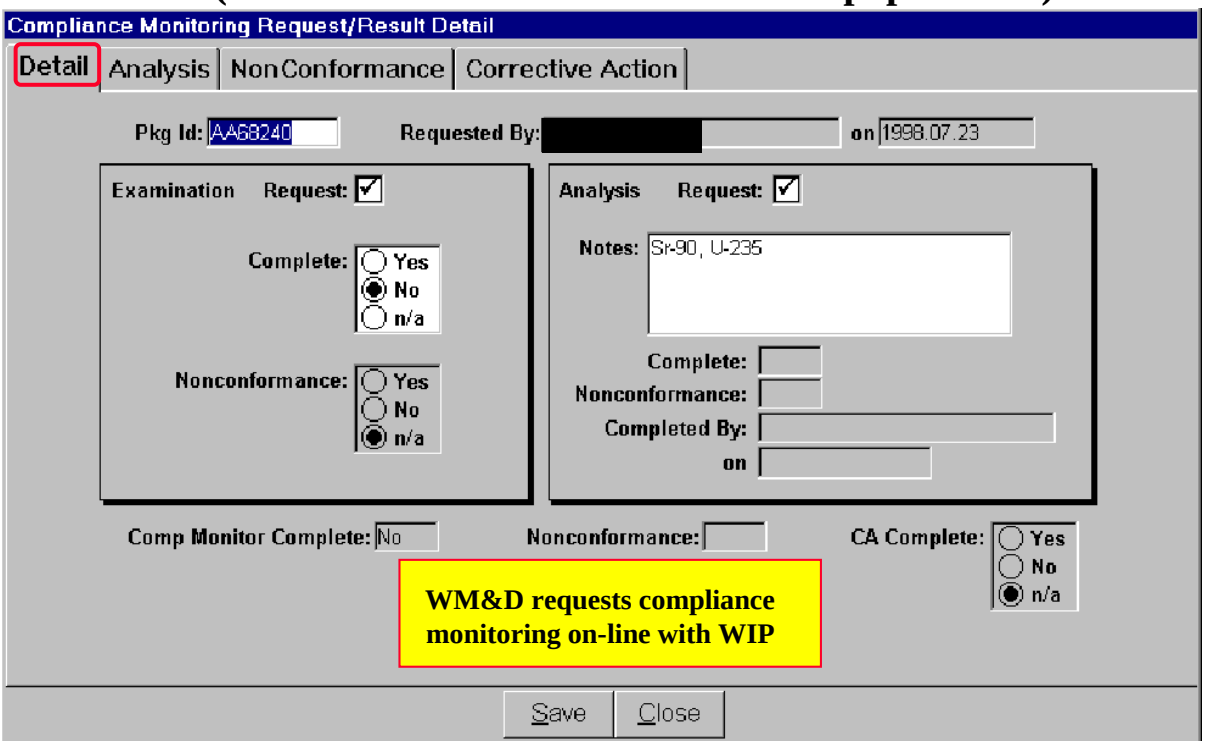
see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

✘ ✓Compliance Monitoring is an integrated WIP-III function (reduces effort to create/maintain a 'paper trail')



33

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - the recording of compliance monitoring information is shown here.

WMA staff stopped using this WIP-III module

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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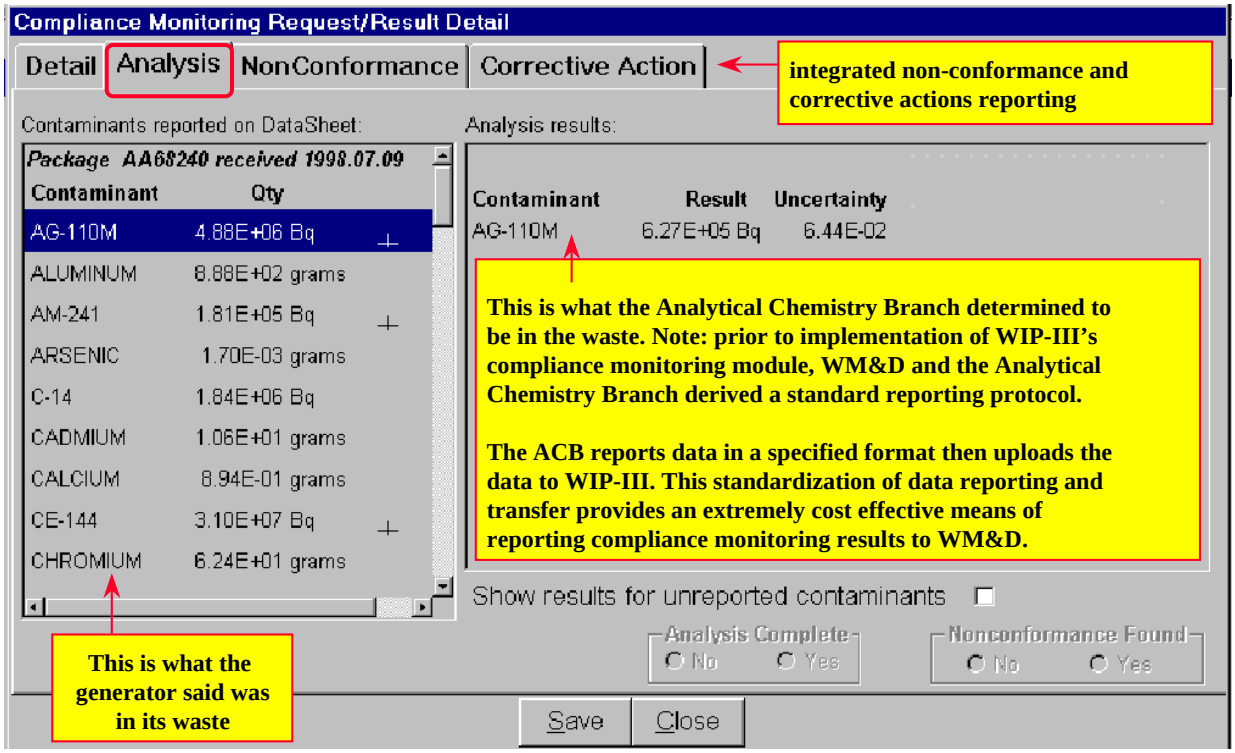
B_1

✘ ✓Compliance Monitoring is an integrated WIP-III function (reduces effort to create/maintain a 'paper trail')



34

This slide illustrates how WIP-III is integrated with day-to-day waste management operations - the recording of compliance monitoring information is shown here.

WMA staff stopped using this WIP-III module.

More importantly, in the 1990's "Analytical Chemistry" information management system was linked to WIP-III to minimize the effort associated with compliance monitoring and to ensure traceability (QA) of the data. That link was abandoned.

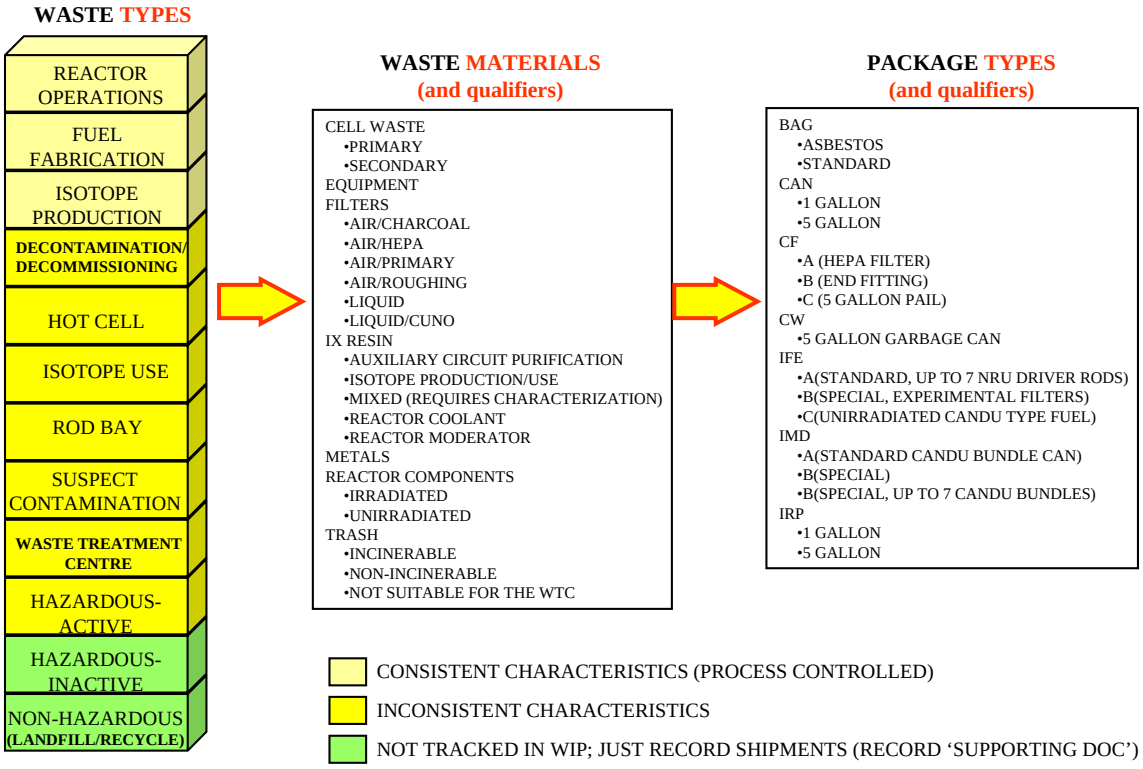
see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_1

WIP-III tracks wastes according to various parameters - this information is used to optimize operations and to plan for disposal



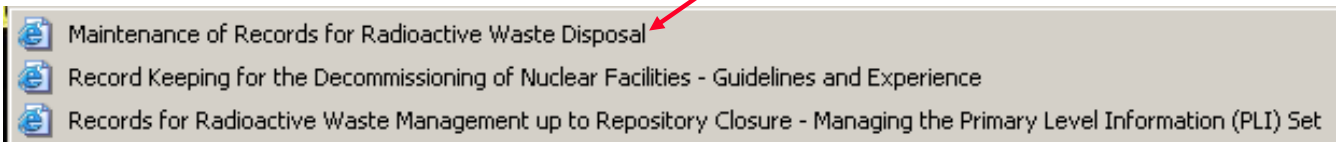
35

This slide illustrates some of types of information that are stored for radioactive wastes - this information is used to optimize waste management operations and to plan for future activities.

see notes pages for more info

The following illustrates how WIP-III features facilitate the long-term record management goals described by a draft IAEA TECDOC

3 TECDOCs now published



see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

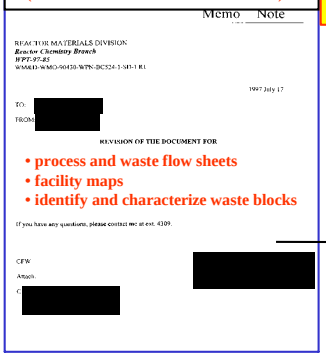
file = big picture presentation for WM-Pgm staff.ppt

Documentation for Routine, Current Wastes

Waste Management Plan
(WM&DO-WMO-90430-WPN-BCXXX-n)

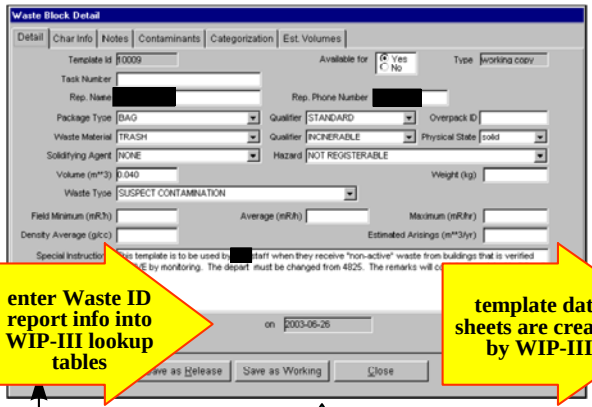
- points to waste identification reports
- waste management policy
- waste minimization plan
- waste management procedures
- waste transfer procedure

Waste Identification Report(s)
(WM&DO-WMO-90430-WPN-BCXXX-n-SD-m)



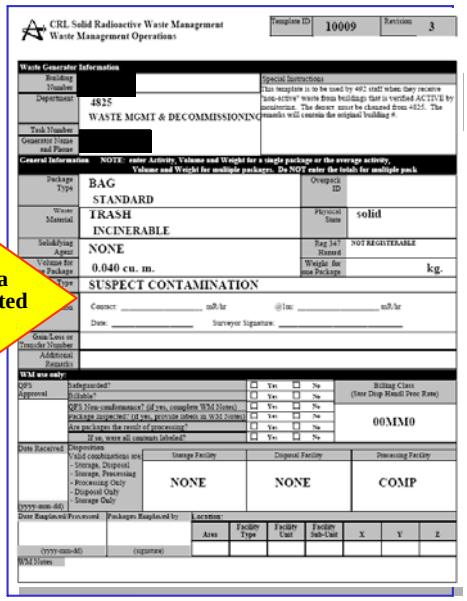
- process and waste flow sheets
- facility maps
- identify and characterize waste blocks

These documents describe where and how routine wastes were generated. They also describe how these wastes were characterized.



enter Waste ID report info into WIP-III lookup tables

template data sheets are created by WIP-III



These lookup tables have pointers to waste management plans and waste ID reports.

In addition, e-mail and other notes can be pasted into the "WMO notes" field to add to the documentation trail

WIP-III allows waste management plans and any other document to be merged within WIP-III (to be viewed on request)

37

WIP-III integrates information about a waste package's characteristics and location along with the supporting documentation that describes how the waste's characteristics were determined. This integration of information sets will greatly facilitate the task of identifying what information should be transferred to future societies (see previous slide).

The term "WIRKS" in this slide stands for "Waste Inventory Record Keeping Systems", which is used in an IAEA draft (1998) technical document entitled, "Waste Inventory Record Keeping System(WIRKS) for Radioactive Waste Disposal". Canada participated in drafting of the WIRKS document (the Figure in this slide is an excerpt from the draft IAEA document).

This slide illustrates the integration of supporting documentation for routine wastes along with waste inventory data (package characteristics and location).

The X indicates that filing these documents in TRAK, AECL's corporate document mgmt system, replaced filing them in WIP-III. However, **this action does not take into account the different time frames between waste management information and the "business horizon" time frame for operations**. Splitting CANDU from the rest of AECL could spell the end of TRAK, even if only its future maintenance. This could have a negative impact on information management in support of waste management and decommissioning operations.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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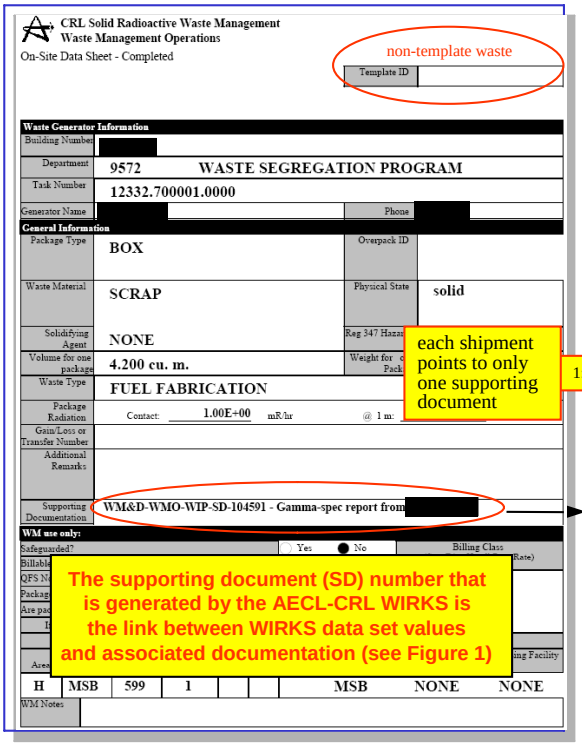
Documentation for Non-Routine, Current Wastes

shipment copy of completed "standard" data sheet
(data sheet information entered into AECL-CRL WIRKS)



CRL Solid Radioactive Waste Management
Waste Management Operations
On-Site Data Sheet - Completed

non-template waste

Template ID

Waste Generator Information

Building Number	[redacted]
Department	9572 WASTE SEGREGATION PROGRAM
Task Number	12332.700001.0000
Generator Name	[redacted] Phone [redacted]

General Information

Package Type	BOX	Overpack ID	
Waste Material	SCRAP	Physical State	solid
Solidifying Agent	NONE	Reg 347 Hazard	
Volume for one package	4.200 cu. m.	Weight for one Package	
Waste Type	FUEL FABRICATION		
Package Radiation	Contact: 1.00E+00 mR/hr @ 1 m:		
Gain/Loss or Transfer Number			
Additional Remarks			
Supporting Documentation	WM&D-WMO-WIP-SD-104591 - Gamma-spec report from [redacted]		

WM use only:

Safeguarded? Yes ● No Billing Class

H	MSB	599	1			MSB	NONE	NONE

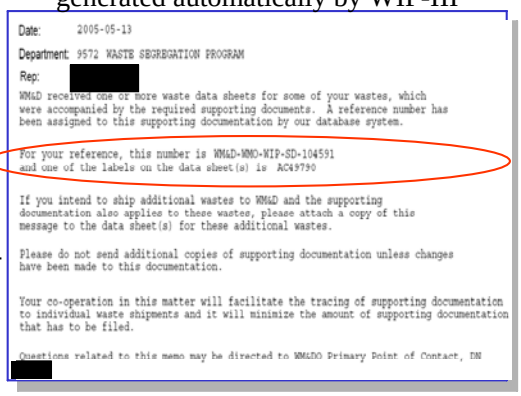
WM Notes

each shipment points to only one supporting document

1:1

The supporting document (SD) number that is generated by the AECL-CRL WIRKS is the link between WIRKS data set values and associated documentation (see Figure 1)

✘✓ a supporting document memo is generated automatically by WIP-III



Date: 2005-05-13

Department: 9572 WASTE SEGREGATION PROGRAM

Rep: [redacted]

WM&D received one or more waste data sheets for some of your wastes, which were accompanied by the required supporting documents. A reference number has been assigned to this supporting documentation by our database system.

For your reference, this number is WM&D-WMO-WIP-SD-104591 and one of the labels on the data sheet(s) is AC49790

If you intend to ship additional wastes to WM&D and the supporting documentation also applies to these wastes, please attach a copy of this message to the data sheet(s) for these additional wastes.

Please do not send additional copies of supporting documentation unless changes have been made to this documentation.

Your co-operation in this matter will facilitate the tracing of supporting documentation to individual waste shipments and it will minimize the amount of supporting documentation that has to be filed.

Questions related to this memo may be directed to WM&DO Primary Point of Contact, DN [redacted]

1:n

one supporting document can be used for more than one waste shipment

1:1

WM&D-WMO-

ldfk;ldsf dfs
dlfsd;lfjdsl;fk
sdf'ksdfk
dsflsdff;jl
dsf;dsfjfdl dfds
sd;lfds
;kklsdf;lkjds
sdfsdfldsfjffdsf

the "SD" number is added to the document supplied by the generator

customer supplied supporting document

In addition to a link to supporting documents, the supporting documents themselves can be merged within the AECL-CRL WIRKS data set

38

This slide illustrates the integration of supporting documentation for non-routine wastes along with waste inventory data (package characteristics and location).

X indicates that WMA staff stopped issuing these automatically generated memos to generators; which resulted in generators having to re-submit or create new supporting documentation rather than re-use previously submitted supporting documentation.

REFERENCE

M.A. terHuurne, G.W. Csullog, S.M. Dunford, V.R. Hulley, J.D.M. Martin, M.T. Miller, “WIP-III: The Waste Operations Data Management System at AECL’s Chalk River Laboratories”, Waste Management 97, 2-6 March 1997, Tucson, Arizona, USA.

copy of above reference
(embedded WinZip file containing Word 6 and PowerPoint 6 files)

see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

Integrated Waste Management Operating Procedures

B

Sections 1- 8: Procedures

- **pt1: INTERACTIONS WITH CUSTOMERS**
- **pt2: REVIEW OF PRESHIPMENT DOCS**
- **pt3: INSPECTION**
- **pt4: ROUTING AND TRACKING**
- **pt5: COMPLIANCE MONITORING**
- **pt6: WASTE EMPLACEMENT**
- **pt7: STORED WASTE RECOVERY**
- **pt8: FACILITY SPECIFIC DOCUMENTS**

Additional sections contain supporting, reference and associated documents

✘✓ **Inspection of Incoming Waste and Documentation and On-Site Shipping Procedures**

Documents Prepared and Maintained

- WMS-WRC-OP-1, “Handling Waste at the WRC”
- WMS-OP-7A, “Waste Inspection Procedures”
- WMS-OP-5, “Selecting Waste for Compliance Monitoring”
- WMS-OP-4, “Nonconformance Reporting”
- Disposal Trailer Procedure
- Scrap Truck Procedure
- Bale/Drum Shipment Procedure
- Drum Overpack/Float Shipment Procedure
- Flask Shipment Procedure

40

This slide provides an overview of the IOP’s procedures related to waste inspection, compliance monitoring and non-conformance reporting.

X indicates that WMA staff stopped using WIP-III’s waste/document inspection module, its compliance monitoring module and its non-conformance/corrective actions module. They also stopped following the waste inspection procedures and the compliance monitoring procedures. In addition, they stopped using the glovebox that was specifically set up to inspect wastes and collect samples for analyses.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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Integrated Waste Management Operating Procedures

Sections 1- 8: Procedures

- pt1: INTERACTIONS WITH CUSTOMERS
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- pt4: ROUTING AND TRACKING ✘
- pt5: COMPLIANCE MONITORING
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- pt7: STORED WASTE RECOVERY
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Additional sections contain supporting, reference and associated documents

B

✘✓ **Routing of Waste to Storage/Disposal Locations**

Based on Waste Class assigned, the procedures in this section of the integrated operating procedures document ensure that wastes are routed to the right facilities and that the routing is recorded in the WIP-III database

Documents Prepared and Maintained
- WMS-OP-3, "Waste Package Tracking Strategy"

B_2

41

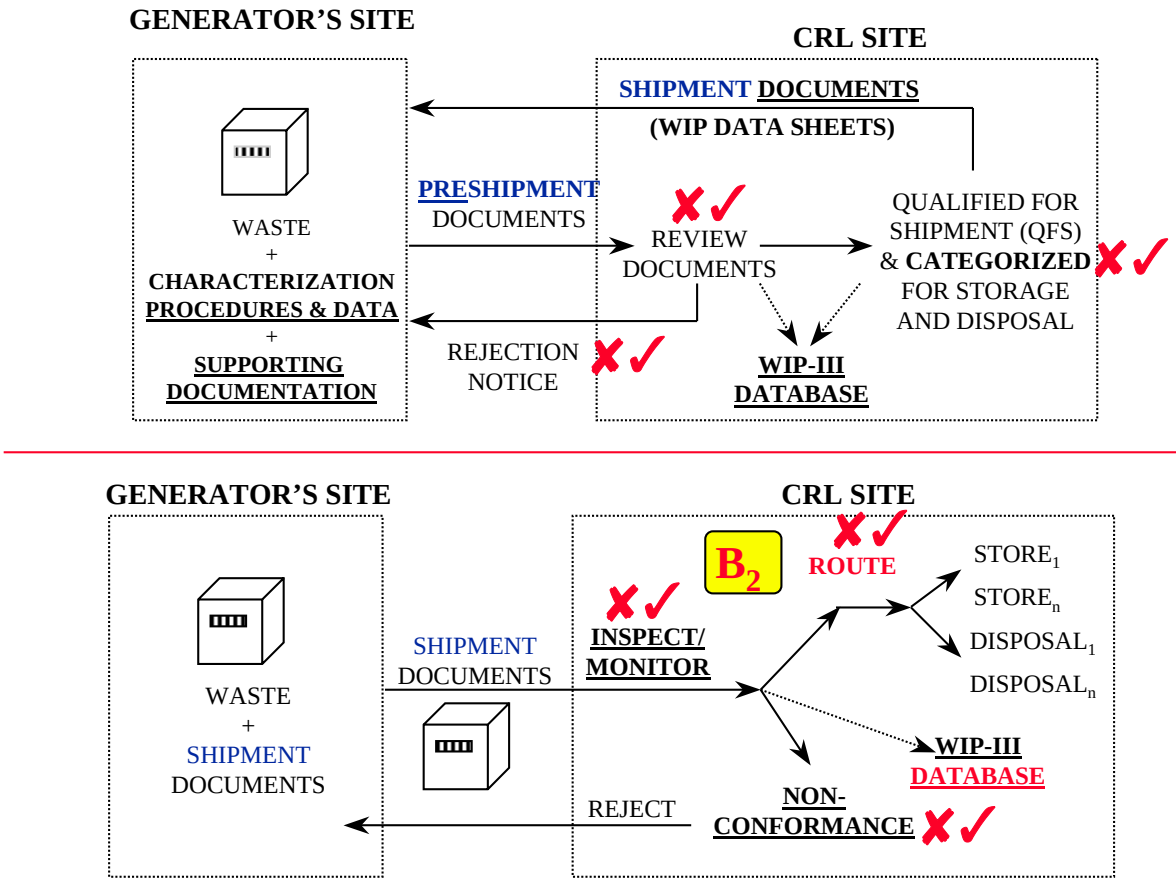
This slide provides an overview of the IOP's procedures related to waste routing and tracking (remember that routing and tracking are functions that are integrated with WIP-III)

X indicates WMS-OP-3 was dropped. In addition, deficiencies in tracking were documented in a Sept 2007 ImpAct (as of Jan 2010, these were not resolved).

see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt



42

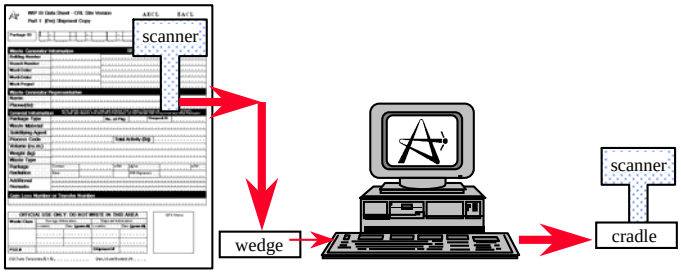
This slide simply shows where routing and tracking fit into the overall waste operations process.

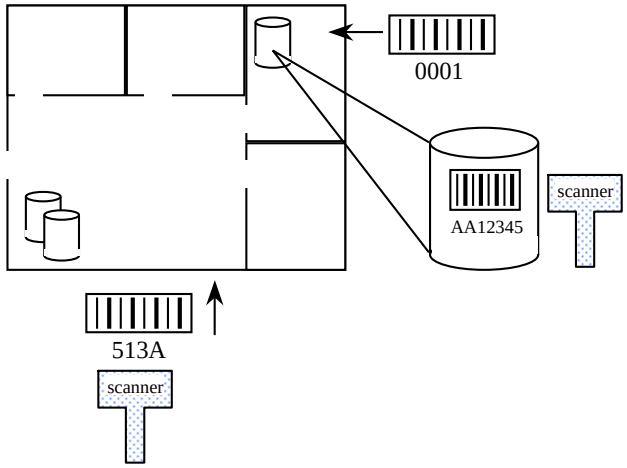
see notes pages for more info

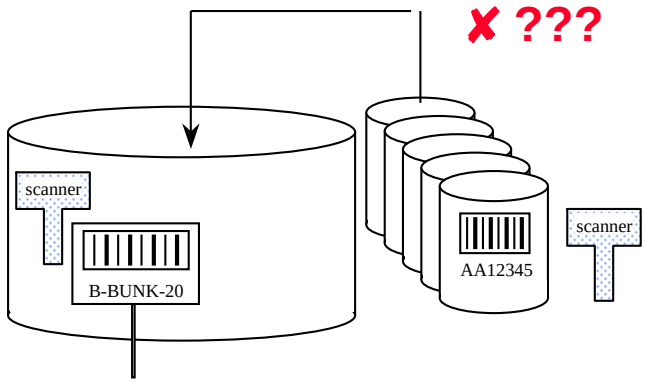
Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

B_2







43

This viewgraphs illustrates the proposed implementation of bar-coded tracking of wastes with WIP-III (implementation delayed due to other higher priority tasks)

see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

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Integrated Waste Management Operating Procedures

Sections 1- 8: Procedures

- pt1: INTERACTIONS WITH CUSTOMERS
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- pt5: COMPLIANCE MONITORING ✘
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- pt7: STORED WASTE RECOVERY
- pt8: FACILITY SPECIFIC DOCUMENTS

Additional sections contain supporting, reference and associated documents

B

✘✓ **Compliance Monitoring**

This section of the integrated operations manual contains procedures for validating generator estimates of waste characteristics

Documents Prepared and Maintained
- WMS-WRC-OP-6, "Gamma Monitoring of Waste Pkgs"
- WMS-WRC-OP-4, "Compl Monitor Organiz" (not written)
- destructive compliance monitoring procedures

B_3

44

This slide provides an overview of the IOP's procedures related to compliance monitoring (remember that compliance monitoring is a function that is integrated with WIP-III)

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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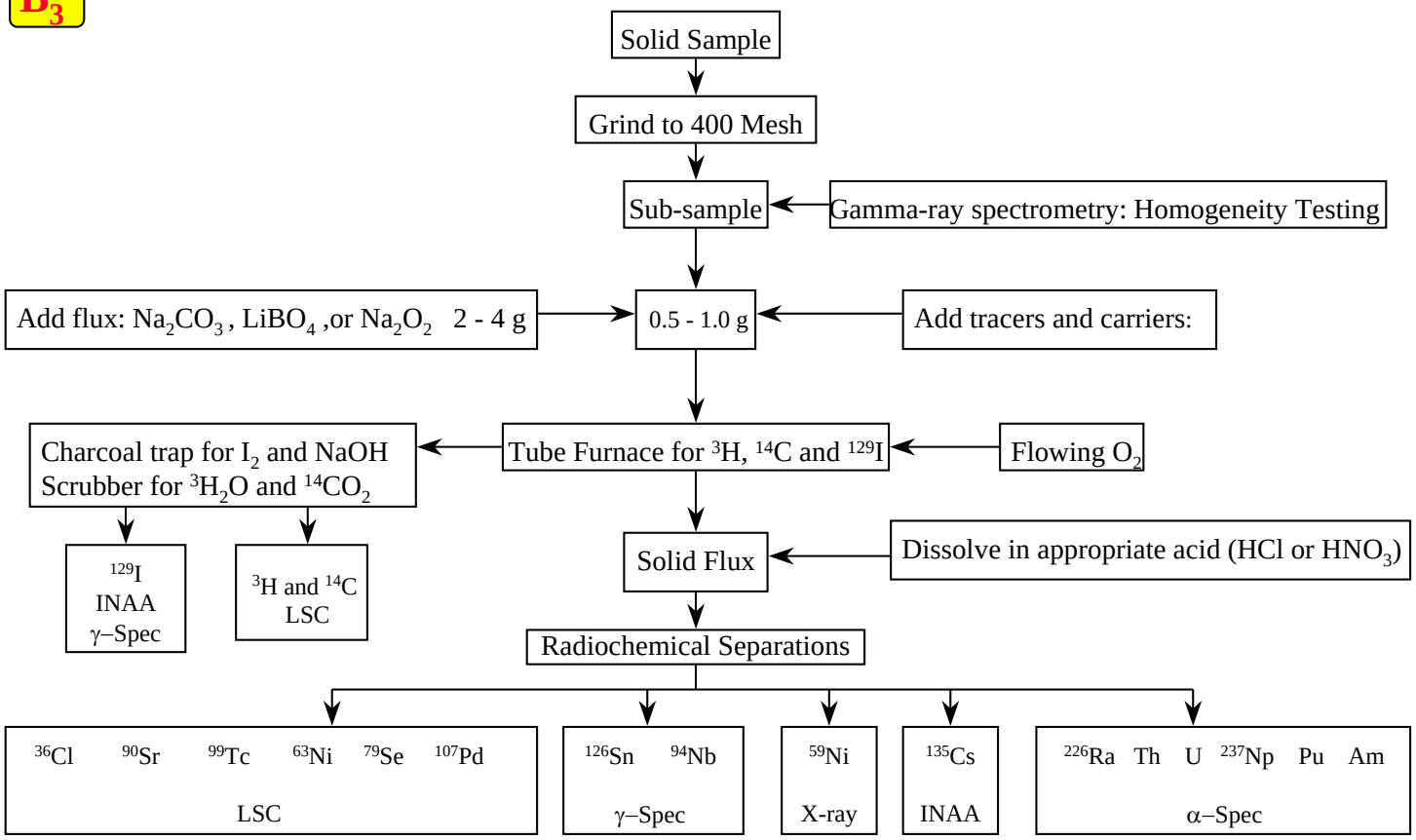
B_3

Radiochemical Analysis Flow Sheet



45

This slide provides a partial overview of procedures related to destructive compliance monitoring (remember that compliance monitoring is a function that is integrated with WIP-III)

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

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Integrated Waste Management Operating Procedures

Sections 1- 8: Procedures

- pt1: INTERACTIONS WITH CUSTOMERS
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- **B** pt6: WASTE EMPLACEMENT
- pt7: STORED WASTE RECOVERY
- pt8: FACILITY SPECIFIC DOCUMENTS

Additional sections contain supporting, reference and associated documents

Waste Emplacement and Recovery ?

These sections of the integrated operations manual contains procedures for routine waste emplacement and for waste recovery

Documents Prepared and Maintained

- WMS-WMA-OP-5, “Tile Hole Emplacement”
- WMS-WMA-OP-7, “Bunker Emplacement”
- WMS-WMA-OP-8, “Area C Emplacement”
- WMS-WMA-OP-11, “PCB Transfers”
- WMS-WMA-OP-12, “Equipment Storage in Area D”
- WMS-WMA-OP-18, “Nonconformances Procedure for Waste Emplacements”
- WMS-WMA-OP-19, “Tile Hole Recovery”

46

This slide provides an overview of the IOP procedures for placing wastes into storage facilities and for their recovery (for remediation activities or as a prelude to disposal)

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

Integrated Waste Management Operating Procedures

Sections 1- 8: Procedures

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- pt6: WASTE EMPLACEMENT
- pt7: STORED WASTE RECOVERY
- pt8: FACILITY SPECIFIC DOCUMENTS

B

Additional sections contain supporting, reference and associated documents

Facility Specific Documents ?

These sections of the integrated operations manual contains procedures related to facility operation.

Documents Prepared and Maintained
Waste Reception Centre
- WMS-WRC-EP-1, “WRC Emergency Procedures”
- WMS-WRC-OP-5, “WRC Security Procedures”
- WMS-WRC-OP-2, “WRC Maintenance & Decontam”

Waste Management Areas
- WMS-WMA-EP-1, “High Rad and Contam Emerg Procs”
- WMS-WMA-OP-1, “Access Control”
- WMS-WMA-OP-15, “Routine Facility Inspection 7 Monit”
- WMS-WMA-OP-16, “Routine Maintenance”

47

This slide provides an overview of the IOP procedures that are required to support licensed waste management facilities

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

Integrated Waste Management Operating Procedures

Sections 1- 8: Procedures

- pt1: INTERACTIONS WITH CUSTOMERS
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B

Additional sections contain supporting, reference and associated documents

Reference Documents ?

These sections of the integrated operations manual contain reference documents (such as radiation protection).

Documents Prepared and Maintained by/on behalf of WM&D

- AECL-FA-18, “Facility Authorization for the WMAs”
- AECL-MISC-306, “S&HA of WMA”
- WMS-TM-30, “WMA Facility Description Document”

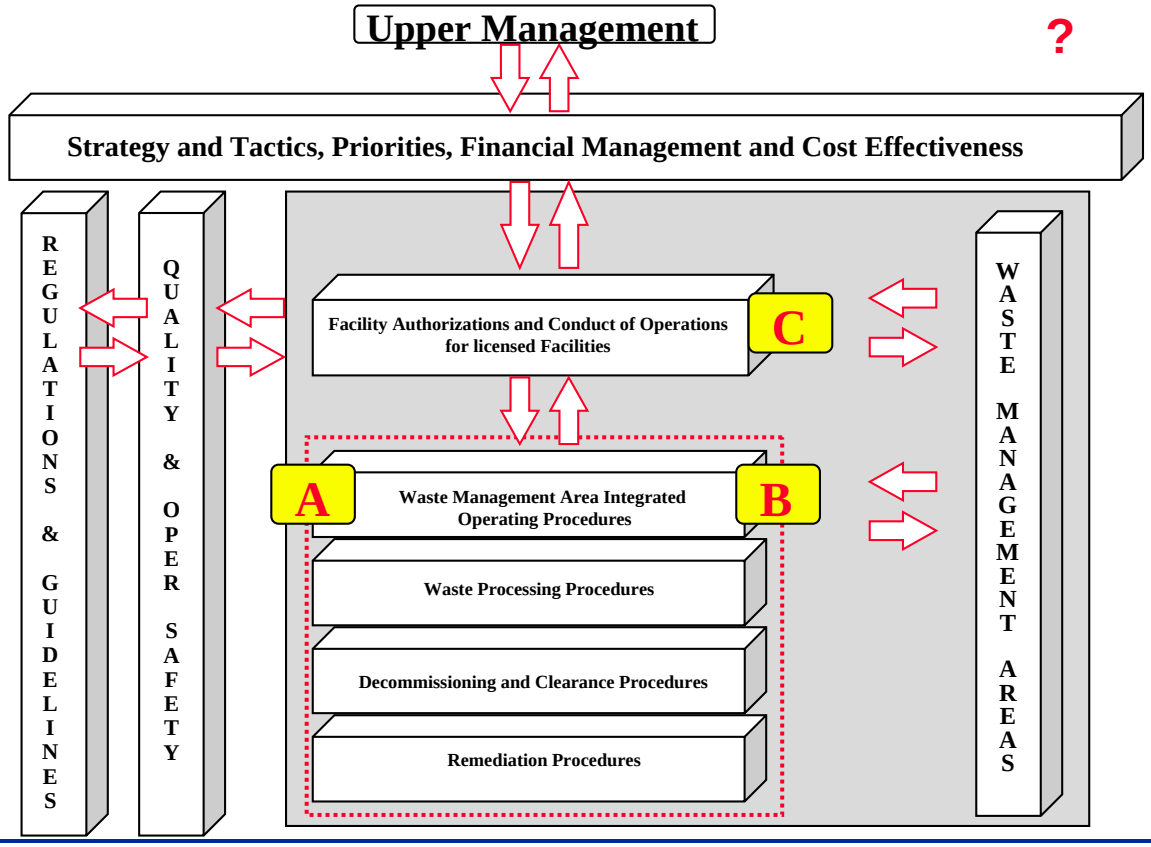
48

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

The Waste Management Areas Integrated Operations Manual is only One of WM&D's Operations Documents



49

see notes pages for more info

- **Up to this point, this slide show has dealt with the management of currently accumulating radioactive wastes.**
- **However, FNO key target, "define inventory of radioactive waste" also includes the definition of the historic radioactive waste inventory.**
- **The remaining slides in this slide show deal with the definition of the historic radioactive waste in AECL's waste management areas (the slides were prepared for a presentation to the SRC in May 1998)**

✘✓ *Assessing Historic Radioactive Waste Inventories*

SRC Audit Recommendation #16

The assessment of historic waste inventories is based on an extension of the Waste Identification program.

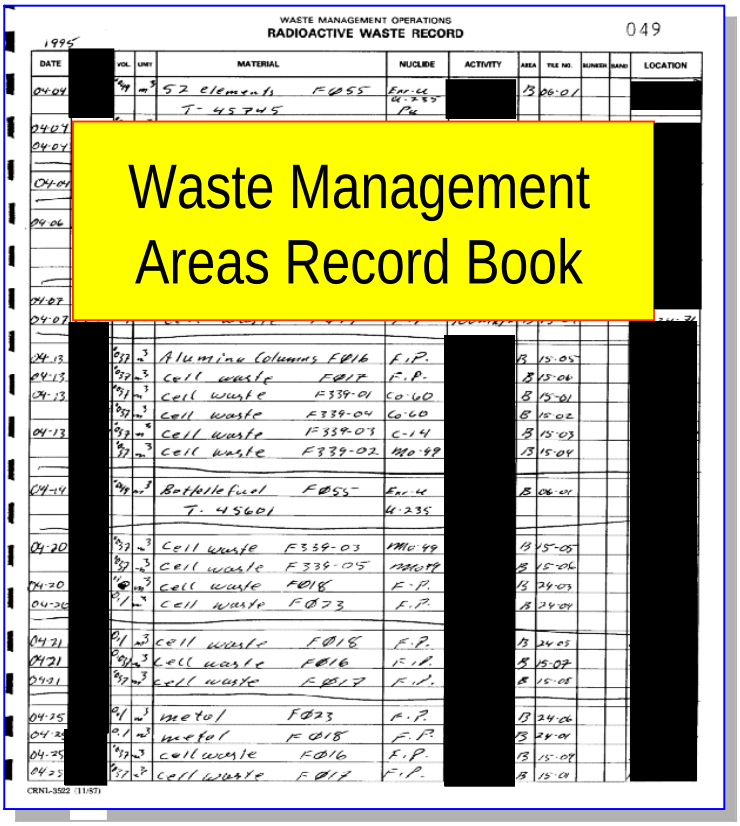
Historic Inventory Project Objective

- estimate the physical, chemical and radiological characteristics of wastes placed into storage facilities at CRL over the last ~50 years, such as:
  - dissolved fuel and debris fuel
  - irradiated reactor components
  - isotope production waste
  - hospital, university, research waste
- this estimate is needed to plan for disposal

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt



An historic waste module was developed for the WIP-III database to convert low quality historic waste records into higher quality records

53

HISTORIC WASTE MODULE

This slide shows a typical, hand-written historic record of waste stored at Chalk River Laboratories. Because many historic records are lower in quality than current waste storage records, an historic waste module was developed for the WIP-III database.

The purpose of the historic module is to upgrade the quality of historic waste records and, then, to assess the historic waste inventory from these upgraded records.

see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

WIP-III Historic Waste Module (cont'd)

1. enter historic info into WIP-III "as-is"

2. collect & scan supporting documentation

3. "expert" interpretation of information to improve quality of historic records

"expert" = collective knowledge of current and past waste generation activities and waste management practices

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HISTORIC WASTE MODULE

The improvement of historic waste records is a three step process:

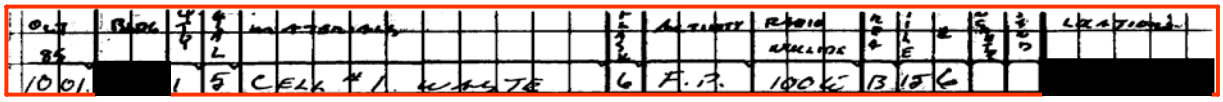
- 1st, "as is" historic waste storage records are entered into WIP-III
- 2nd, documentation that supports the logbook record is collected and scanned into electronic files
- 3rd, "expert" knowledge is used to interpret the "as-is" historic records and supporting documentation to identify historic wastes as similar to a current waste block or to a mixture of current waste blocks.

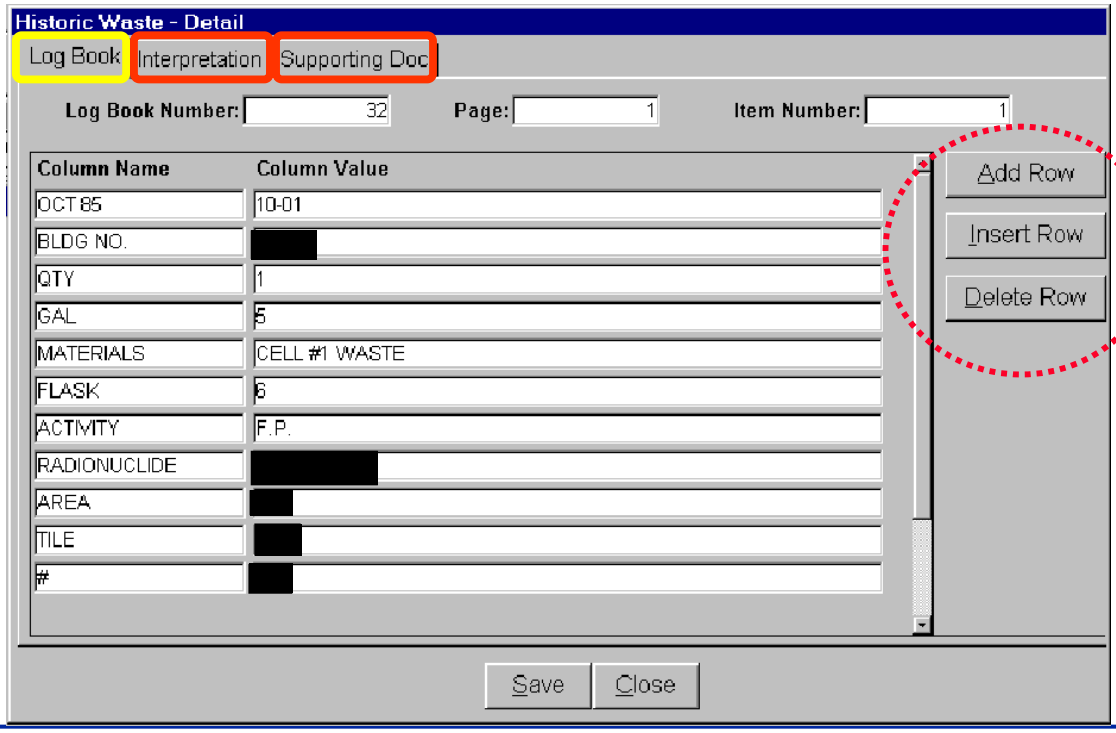
see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

WIP-III Historic Waste Module ("As-Is" Historic Data Entry)





55

HISTORIC WASTE MODULE

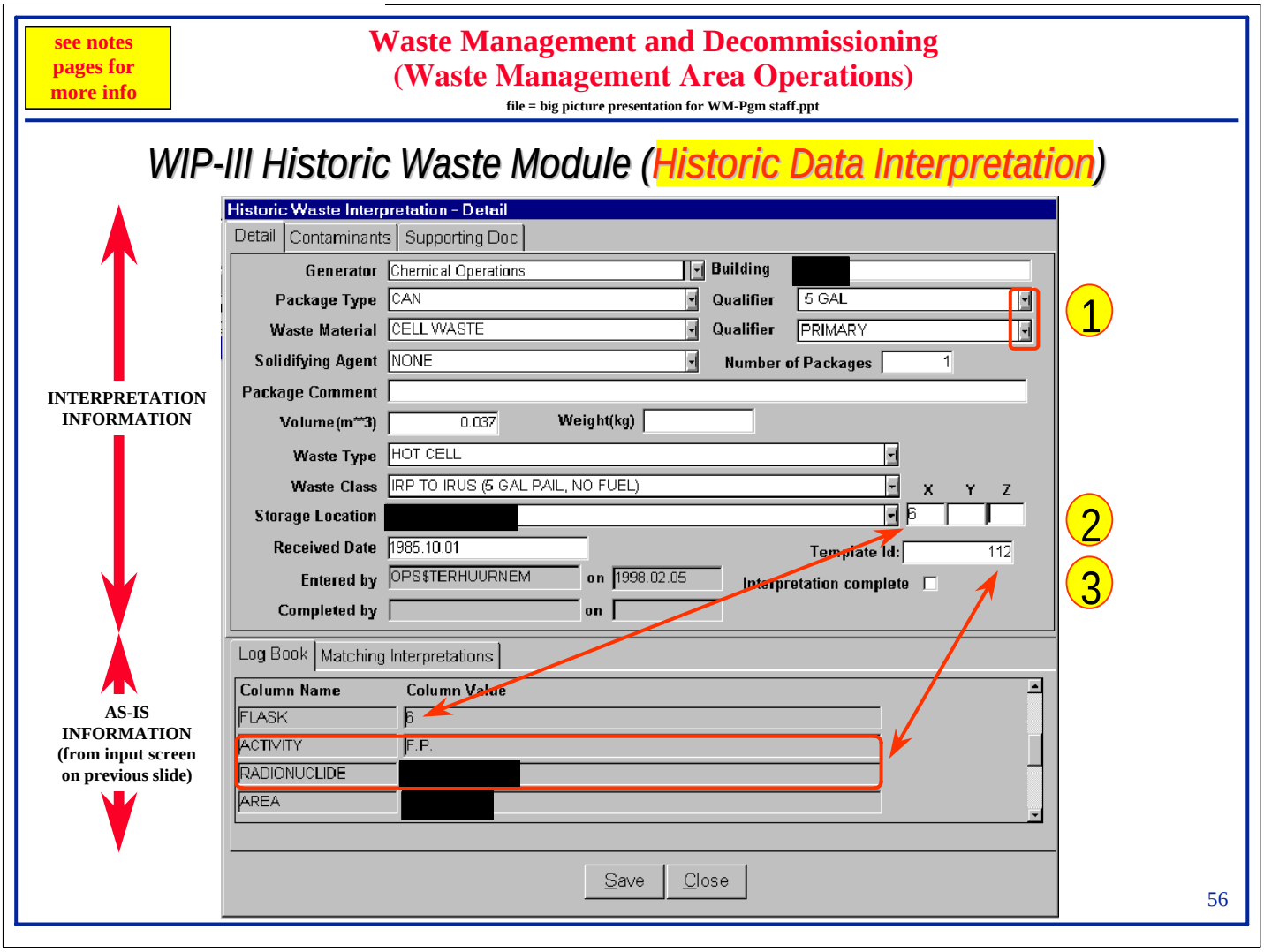
The top of this slide shows part of an actual waste management areas logbook page. Every logbook page has columns and each column has a heading. Historically, the number, name and use of column headings changed between the various logbooks that were used. They even changed within the same logbook.

The person who enters the "as-is" historic information has a limited knowledge of wastes and is required to key in the "as-is" without interpretation.

A problem was recognized - How does a person with limited knowledge of wastes enter changing data for waste storage records into a database if the database has a fixed structure?

The solution - allow dynamic designing of the data entry screen (using the add, insert and delete buttons)

As logbook pages change structure, the data entry person re-works the data entry screen to fit the "as-is" structure and can, therefore, key in historic information without interpretation.



HISTORIC WASTE MODULE

This slide shows the WIP-III database screen that is used to interpret historic records. The bottom half of the screen (gray area) can display the "as-is" historic information that was entered previously. The top half of the screen is used for the "expert" interpretation.

Three features of this slide are:

(1) The interpretation is constrained to describe historic wastes using definitions and terms applied to current wastes. The expert who interprets historical records can only select options from WIP-III's drop down lists, which were set up to describe current wastes. This constraint reduces the variability of historic waste records by forcing them to be described by a prescribed list of terms.

(2) Interpretation requires a detailed knowledge and understanding of how both current and historic records were used. In this case, the logbook column for "FLASK" actually recorded the vertical position of a waste package in a tile hole (6th item in). Often, interpretation requires seeking out someone who has an historic knowledge of how wastes were generated and managed in the past.

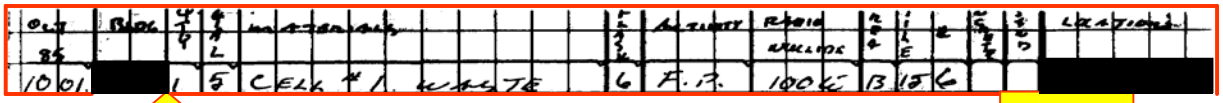
(3) If the historic waste can be determined to be equal to or similar to a current waste, the current waste's block number is entered into the interpretation screen. In the case shown here, the contaminant inventory for current waste block 112 is assigned to the historic record, which only identified 100 Ci of mixed fission products as the contaminants.

see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

WIP-III Historic Waste Module (Historic Data Interpretation)



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becomes

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AECL - On-Site Data Sheet

Template ID	112	Revision	1

1998.02.06 14:34

Listing of Contaminants

Contaminants identified in Waste Identification Program:

Type	Contaminant	Average Qty	Type	Contaminant	Average Qty
Long Lived Nuclide	AG-108M	Suspect	*Long Lived Nuclide*	AM-241	2.17E+04 Bq
Long Lived Nuclide	AM-242M	Suspect	*Long Lived Nuclide*	AM-243	1.24E+03 Bq
Long Lived Nuclide	AR-39	Suspect	*Long Lived Nuclide*	C-14	3.48E+07 Bq
Long Lived Nuclide	CA-41	Suspect	*Long Lived Nuclide*	CD-109	6.26E+03 Bq
Long Lived Nuclide	CD-113M	Suspect	*Long Lived Nuclide*	CL-36	8.29E+00 Bq
Long Lived Nuclide	CM-243	Suspect	*Long Lived Nuclide*	CM-244	2.60E+05 Bq
Long Lived Nuclide	CM-245	Suspect	*Long Lived Nuclide*	CM-246	Suspect
Long Lived Nuclide	CO-60	1.42E+12 Bq	*Long Lived Nuclide*	CS-134	8.86E+06 Bq
Long Lived Nuclide	CS-135	2.50E+01 Bq	*Long Lived Nuclide*	CS-137	1.04E+07 Bq
Long Lived Nuclide	EU-152	Suspect	*Long Lived Nuclide*	EU-154	6.99E+05 Bq
Long Lived Nuclide	EU-155	4.07E+05 Bq	*Long Lived Nuclide*	FE-55	8.00E+08 Bq

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HISTORIC WASTE MODULE

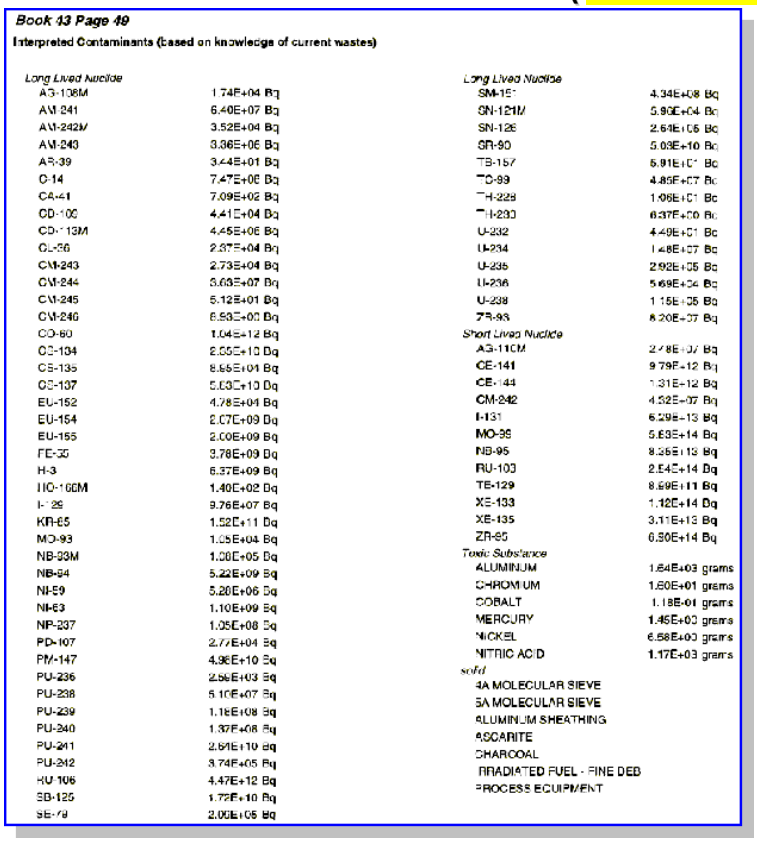
This slide shows the effect of assigning the characteristics of a current waste block to an historic waste in storage. Where little information had been recorded about the contents of an historic waste package, the interpretation has assigned the average contaminant inventory from a current waste block.

see notes pages for more info

Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

WIP-III Historic Waste Module (Historic Data Interpretation)



Book 43 Page 49

Interpreted Contaminants (based on knowledge of current wastes)

Long Lived Nuclide		*Long Lived Nuclide*	
AG-108M	1.74E+04 Bq	SM-151	4.34E+08 Bq
AM-241	6.40E+07 Bq	SN-121M	5.90E+04 Bq
AM-242M	3.52E+04 Bq	SN-126	2.64E+06 Bq
AM-243	3.36E+06 Bq	SR-90	5.03E+10 Bq
AR-39	3.44E+01 Bq	TB-157	5.91E+07 Bq
C-14	7.47E+06 Bq	TC-99	4.85E+07 Bq
CA-41	7.09E+02 Bq	TH-228	1.06E+01 Bq
CD-109	4.41E+04 Bq	TH-230	6.37E+06 Bq
CD-113M	4.45E+06 Bq	U-232	4.49E+01 Bq
CL-36	2.37E+04 Bq	U-234	1.48E+07 Bq
CM-243	2.73E+04 Bq	U-235	2.92E+05 Bq
CM-244	3.63E+07 Bq	U-236	5.69E+04 Bq
CM-245	5.12E+01 Bq	U-238	1.15E+05 Bq
CM-246	8.53E+00 Bq	ZR-93	8.20E+07 Bq
CO-60	1.04E+12 Bq	*Short Lived Nuclide*	
CS-134	2.55E+10 Bq	AG-110M	2.78E+07 Bq
CS-135	8.56E+01 Bq	CE-141	9.79E+12 Bq
CS-137	5.63E+10 Bq	CE-144	1.31E+12 Bq
EU-152	4.78E+04 Bq	CM-242	4.52E+07 Bq
EU-154	2.07E+09 Bq	I-131	6.29E+13 Bq
EU-155	2.00E+09 Bq	MO-99	5.83E+14 Bq
FE-55	3.78E+09 Bq	NB-95	8.35E+13 Bq
H-3	6.37E+09 Bq	RU-103	2.54E+14 Bq
HO-166M	1.40E+02 Bq	TE-129	8.99E+11 Bq
I-129	9.76E+07 Bq	XE-133	1.12E+14 Bq
KR-85	1.52E+11 Bq	XE-135	3.11E+13 Bq
MO-93	1.05E+04 Bq	ZR-95	6.30E+14 Bq
NB-93M	1.00E+05 Bq	*Toxic Substance*	
NB-94	5.22E+09 Bq	ALUMINUM	1.64E+03 grams
NI-59	5.20E+06 Bq	CHROMIUM	1.60E+01 grams
NI-63	1.10E+09 Bq	COBALT	1.18E+01 grams
NP-237	1.05E+08 Bq	MERCURY	1.45E+03 grams
PD-107	2.77E+04 Bq	NICKEL	6.58E+03 grams
PM-147	4.96E+10 Bq	NITRIC ACID	1.17E+03 grams
PU-236	2.56E+03 Bq	*solid*	
PU-238	5.10E+07 Bq	4A MOLECULAR SIEVE	
PU-239	1.18E+08 Bq	5A MOLECULAR SIEVE	
PU-240	1.37E+08 Bq	ALUMINUM SHEATHING	
PU-241	2.64E+10 Bq	ASCARITE	
PU-242	3.74E+05 Bq	CHARCOAL	
RU-106	4.47E+12 Bq	IRRADIATED FUEL - FINE DED	
SB-125	1.72E+10 Bq	PROCESS EQUIPMENT	
SE-79	2.00E+05 Bq		

additional contaminants interpreted to be in the historic inventory when some historical records were matched to current waste blocks

59

HISTORIC WASTE MODULE

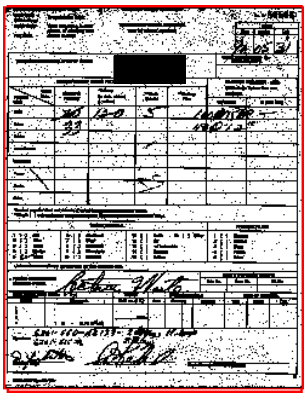
This slide shows the additional, interpreted contaminant inventory for all historical waste receipts recorded on page 49 of logbook 43. This additional inventory derives from the assignment of the characteristics of current waste blocks 101, 104 and 116 to some of the historical records.

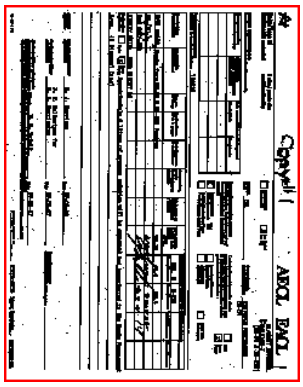
see notes pages for more info

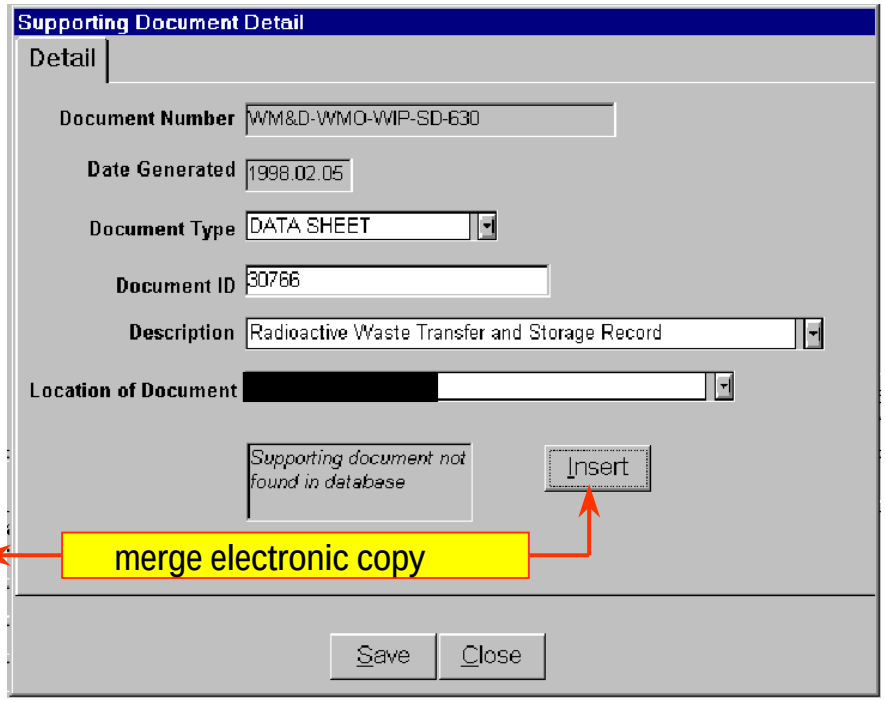
Waste Management and Decommissioning
(Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

WIP-III Historic Waste Module (Supporting Documentation)







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HISTORIC WASTE MODULE

This slide shows how supporting documents for logbook records, for example data sheets and fissile materials accounting forms, are managed.

• a unique ID number is assigned by the WIP-III database,

• documents categorized by type (e.g.., data sheet),

• the location of hard copies of documents is recorded, and

• their electronic images are merged with WIP-III.

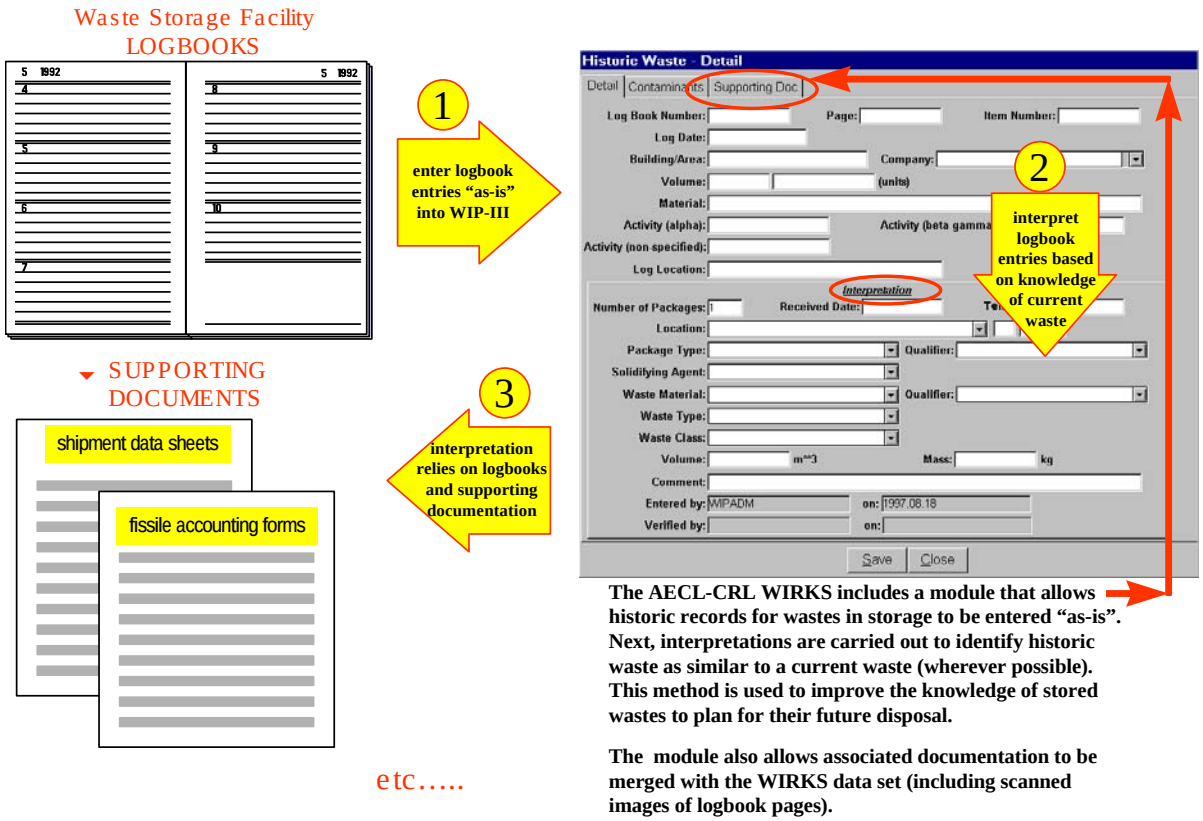
Supporting documents are key elements for the interpretation of logbook records, therefore, it is important to provide a secure archive of these documents.

see notes pages for more info

Waste Management and Decommissioning (Waste Management Area Operations)

file = big picture presentation for WM-Pgm staff.ppt

Documentation for Historical Wastes



The AECL-CRL WIRKS includes a module that allows historic records for wastes in storage to be entered "as-is". Next, interpretations are carried out to identify historic waste as similar to a current waste (wherever possible). This method is used to improve the knowledge of stored wastes to plan for their future disposal.

The module also allows associated documentation to be merged with the WIRKS data set (including scanned images of logbook pages).

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The term "WIRKS" in this slide stands for "Waste Inventory Record Keeping Systems", which is used in an IAEA draft (1998) technical document entitled, "Waste Inventory Record Keeping System(WIRKS) for Radioactive Waste Disposal". Canada participated in drafting of the WIRKS document (the Figure in this slide is an excerpt from the draft IAEA document).

This slide illustrates the integration of supporting documentation for historic wastes along with waste inventory data (package characteristics and location).

Please refer to Slides 37 and 38 as well.

see notes pages for more info

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Interpretation relies on a “collective knowledge”

- knowledge of current waste blocks
- knowledge of how wastes used to be “mixed”
- assembly/organization of historic records

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Environmental Restoration - Area A, LDA's

- Assemble and interpret information for the purpose of supporting assessments of "as-is" evolution of the sites.
- Contaminant inventory information includes inventories remaining in the facility as well as mobilized contaminants migrating in the groundwater and the surface environment (plants, surface soils, and surface water).

Tile Hole Remediation

- assemble/organize IFE and IMD tile hole records
- project was set up to determine disposition of fuels contained in the tiles
- “tile hole database” created (MS-Access)
- database to be turned over to Waste Mgmt Operations when “static”
- database to be either merged with WIP-III or linked to WIP-III

Mo-99 Waste Inventory Review

- assemble/organize records for “molly” waste in IRP tile holes
- spreadsheet set up by Norm Edwards
- plan is to create another “tile hole database” (Doyle)

REFERENCE

G.W. Csullog, M.A. terHuurne, M.T. Miller, N.W. Edwards, V.R. Hulley, D.J. McCann , "Assessing Inventories of Paste Waste Arisings at Chalk River Laboratories", Waste Management 98, 1-5 March 1998, Tucson, Arizona, USA.

WM98.zip

copy of above reference
(embedded WinZip 95 file containing Word 7 and PowerPoint 7 files)