THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

REPORT

relating to the

CONSTRUCTION OF A SHELL FILLING FACILITY FOR ST MARYS MUNITIONS FILLING FACTORY, NSW

(Sixth Report of 1989)

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MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

(Twenty-Ninth Committee)

Mr Colin Hollis MP (Chairman)
Mr Percival Clarence Millar MP (Vice-Chairman)

Senate	House of Representatives
Senator Bryant Robert Burns	Mr George Gear MP
Senator John Devereaux	Mr Robert George Halverson OBE MP
Senator Dr Glenister Sheil	Mr John Graham Mountford MP
	Mr William Leonard Taylor MP *

* Appointed on 29.9.88 following resignation of
Mr Maxwell Arthur Burr MP

Sectional Committee on Construction of Shell Filling Facility for St Marys Munitions Filling Factory, New South Wales

Mr Colin Hollis MP (Chairman)
Mr Percival Clarence Millar MP (Vice Chairman)
Mr Robert George Halverson OBE MP
Mr William Leonard Taylor MP

Secretary: Mr Peter Roberts
Inquiry Staff: Ms Helen Hutchins

EXTRACT FROM THE VOTES AND PROCEEDINGS OF
THE HOUSE OF REPRESENTATIVES

NO. 84 DATED THURSDAY 20 OCTOBER 1988

23 **PUBLIC WORKS COMMITTEE - REFERENCE OF WORK - CONSTRUCTION OF SHELL FILLING FACILITY FOR ST MARYS MUNITIONS FILLING FACTORY, NSW:** Mr West (Minister for Administrative Services), pursuant to notice, moved - That, in accordance with the provisions of the Public Works Committee Act 1969, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for consideration and report: Construction of shell filling facility for St Marys Munitions Filling Factory, NSW.

Mr West presented plans in connection with the proposed work.

Debate ensued.

Question - put and passed.

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

CONSTRUCTION OF A SHELL FILLING FACILITY FOR ST MARYS MUNITIONS FILLING FACTORY, NEW SOUTH WALES

1. By resolution on 20 October 1988 the House of Representatives referred to the Parliamentary Standing Committee on Public Works for consideration and report the proposal for the construction of a shell filling facility for St Marys Munitions Filling Factory, New South Wales.

THE REFERENCE

2. The proposed work is for the construction of a new facility for the filling of high explosive shells at the St Marys Munitions Filling Factory (MFF) located 45km west of Sydney. The proposed facilities have been designed to minimise exposure of employees to dusts and vapours and will provide a safer, more efficient environment, better suited to meet current and future needs of the Department of Defence.

3. The proposal comprises a new process building containing shell preparation; fill and probe sections and a shell finishing section; earth mounds for safety protection; associated engineering services, site works and a trade waste treatment system.

4. The estimated cost of the proposed shell filling factory is $7.7m at April 1988 prices. New plant estimated to cost $6m will be installed during the construction phase.

THE COMMITTEE'S INVESTIGATION

5. The Committee received written submissions from the Department of Defence (Defence) and Australian Construction Services (ACS) and took evidence from representatives of those organisations at a public hearing at St Marys on 13 December 1988.

6. A list of witnesses who appeared at the public hearing is at Appendix A. The Committee's proceedings will be printed as Minutes of Evidence.

BACKGROUND

7. There are currently three main explosives manufacturing factories operated by the Office of Defence Production. These are:

- Munitions Filling Factory (MFF), St Marys, situated about 45km west of Sydney. The major activities are the filling and assembly of gun ammunition, grenades, bombs, demolition stores, fuses, detonators, primers and pyrotechnic stores such as tracers, signal cartridges and smoke producing shells and grenades.

- Mulwala Explosives Factory situated on the New South Wales side of the Murray River near Yarrawonga, Victoria. The major activities of this factory include manufacture of nitrocellulose, nitroglycerine, rifle and gun propellants and casting powders for rocket propellants. In June 1988 following a report by the Committee the House of Representatives approved a $78.4m expansion program at Mulwala (Seventh Report of 1988).

This program is designed to accommodate the relocation of the production facilities from the Albion Explosives Factory, Melbourne. Explosive manufacturing operations at Albion effectively ceased in September 1986.

- Maribyrnong Explosives Factory situated about 20km west of Melbourne. Production activities involve mainly the manufacture of specialised and generally low volume munitions requiring plant and techniques not available at the other factories, particularly rocket motors and some gun propellants.

HISTORY OF ST MARYS MUNITIONS FACTORY

8. During World War II a munitions factory was established at St Marys and in 1943 commenced filling and assembly of munitions for the armed services.

9. Following World War II the factory was mostly closed down and partly leased (and ultimately sold) to private industry. The pyrotechnic section was retained and used mainly for the breaking down of obsolete ammunition.

10. In the early 1950s the Australian Government decided that the capacity of the Maribyrnong Explosives Factory, - at that time Australia's sole filling factory - was inadequate. It was decided to build a modern filling factory at St Marys, on a site adjacent to the wartime factory, to provide the additional filling capacity required to meet the needs of the services.

11. Construction of the new factory, incorporating the old pyrotechnic section, began in September 1955 and was completed by the end of 1957. The most recent major improvements at the factory have been the reconstruction of the pyrotechnics section.

This work was approved by Parliament in 1984 at an estimated cost of $13m (Fifth Report of 1984) and is due for completion in March 1989.

THE NEED

12. Production activities in the existing shell filling facilities at MFF, St Marys began in 1958 and have continued on an almost continual basis even since. It is the only facility in Australia capable of filling shells and is used to load shells from 76 mm calibre up to 5 inches with high explosive (either TNT or mixture of TNT and other explosives).

13. Most medium and heavy calibre shells used by the services are filled with heavy explosive using a process in which the explosive is melted, poured into the shell body and allowed to solidify under controlled conditions. Stringent quality requirements apply as failure to meet these requirements could cause premature explosion of a shell in the gun. As a result of high usage, general wear and corrosion, the existing plant has reached the end of its economic life. In addition, fume, dust and noise levels exceed current regulatory standards. Defence advised the Committee that labour costs will be reduced by approximately 20 percent with the introduction of new plant while maintenance costs will be significantly reduced.

14. The site for the existing filling facility was selected in 1955 to conform with the British Safety Principles for Explosives Distances used in Australia at that time. The land outside the factory boundary closest to the facility was unoccupied and zoned as rural land.

15. In 1968 much of the land on the eastern boundary of the factory was rezoned for development and sold as building blocks. A housing estate now occupies this land. The land adjacent to the shell filling facility remains rural but a number of 2.2 hectare blocks have been occupied.

16. In 1981 Defence adopted the United Nations (UN) system for the classification of dangerous goods and the NATO Safety Principles. These new safety principles are more stringent than the previous regulations in several respects and, as a result, the existing filling facility no longer conforms to the new standards. The distance between this facility and the factory boundary is 220 metres whereas to conform with the NATO Safety Principles, the distance should be at least 400 metres. The Minister for Defence has granted a public risk waiver for an interim period of five years for the continued operation of the existing facility, pending the construction of a new facility.

17. In summary the existing shell filling facility suffers from the following deficiencies:

- it is 31 years old and would require significant expenditure on maintenance and refurbishment in order to continue operations beyond the next few years
- the conditions in respect to health and safety within the facility are substandard
- it fails to meet NATO Safety Principles, particularly in respect to safety distances to inhabited buildings.

18. At the public hearing Defence advised the Committee that in the longer term (beyond 25 years) it expected that urban

encroachment would require the transfer of the MFF to another location. Defence estimated the cost of relocation at half a billion dollars. Following the public hearing the Committee was advised by the Blacktown City Council that it would be seeking a commitment from the Commonwealth for the long term relocation of the entire munitions factory to a more suitable location.

Committee's Conclusion

19. There is a need to replace the existing shell filling facility at St Marys Munitions Filling Facility which has reached the end of its economic life and no longer meets current standards in relation to fume, dust and noise levels.

20. The current facility does not meet NATO Safety Principles particularly in respect of safety distances to inhabited buildings.

THE PROPOSAL

21. The proposed works comprise the following:

- a process building which contains:
  - shell preparation, fill and probing sections
  - shell finishing section
  - process transfer tunnels between the two sections as well as safety escape tunnels
- associated engineering services and site works
- earth mounds for safety protection
- trade waste treatment system
- standby emergency generator equipment.

22. The process building will comprise two interconnected sections. In the first will be provision for holding of shells awaiting filling, unboxing of high explosives, melting of high explosives, preheating of shell, filling of molten explosives into the shell and controlled cooling of the filled shell. The second section will contain provisions for machining of fuse cavities in the explosive and other finishing operations. A number of the processes will be automated and equipment will be designed to keep fumes and dust to acceptable levels. The more hazardous operations such as explosive machining will be done remotely in cubicles which can withstand the effects of any accidental explosion.

General Planning and Design

23. The siting and design of the proposed works have been guided by the following considerations:

- containment of the development within the site limits which comply with explosive quantity distance clearance requirements
- utilisation of existing roadways
- separation within the facility of the two major areas of explosive handling in order to reduce the potential hazard
- containment of high hazard processes within the facility into blast-hardened construction to limit damage in the event of an explosion

- use of frangible, non-projectile forming material in roof and wall construction where applicable

- provision of clear patterns of circulation and process flow for materials and personnel involved in the shell filling process

- use of earth mounds to separate the two main sections of the building and to shield adjourning areas in order to limit high velocity projectile damage

- use of simple building forms for economical construction

- provision of short, direct escape routes for personnel working in the facility

- the building detailing avoids cavities, ledges and crevices which might accumulate explosive dust. Colours of finishes are selected to contribute to safety and to contrast with explosive dust colour where spills or deposits might occur

- the main buildings are generally of single-storey construction except for the melt, pour and fill platforms which form upper levels in order to achieve a gravity feed for the melt and pour process. The two main buildings have pitched roofs with ribbed aluminium sheeting to walls and roofs.

Safety

24. Shell filling involves melting of explosives, pouring molten explosives into shell bodies, controlled cooling of the shell, cavity boring and finishing operations. The new facility will use established processes used in many places around the world. These facilities have excellent safety records. The more hazardous operations such as cavity boring are conducted remotely in compartments which contain the effect of possible (but unlikely) incidents. To further enhance safety the vertical profile of the new facility will be kept to a minimum to ensure that the building can be effectively shielded by mounds. The building and plant have been designed to minimise exposure of employees to toxic dusts and vapours to enable compliance with safe exposure levels as determined by the National Health and Medical Research Council. It is a requirement of the Code of General Principles on Occupational Health and Safety in Australian Government Employment that these limits be observed.

25. MFF has a full time safety officer and safety programs are in place to ensure control and monitoring of day-to-day safety. These programs include:

- a workplace inspection system;
- a clearance officer system;
- fire permit and minor repairs permit systems;
- a building explosive limit licensing system.

26. MFF is also an active participant in the National Safety Council of Australia's Five Star Safety Management System and has achieved a four star rating. This level reflects the substantial and sustained safety awareness of the factory workforce and management. MFF is the first Australian Government industrial organisation to reach this level.

Committee's Conclusion

27. Following assurances from the Department of Defence and in view of the excellent safety record of the St Marys Munitions Filling Factory the Committee is satisfied that safety risks posed by the proposed facility are minimal.

ENVIRONMENTAL ASPECTS

28. A Notice of Intention covering the environmental aspects of the project was submitted by Defence to the Department of the Arts, Sport, the Environment, Tourism and Territories (DASETT) in accordance with the Environment Protection (Impact of Proposals) Act 1974.

29. After consultation with the New South Wales Department of Planning (NSWDOP), DASETT determined that neither a public environment report nor an environmental impact statement is required for the project, provided that in proceeding with implementation of the project the following conditions are satisfied:

- implement all environmental protection measures outlined in the Notice of Intention

- undertake consultations with the New South Wales State Pollution Control Commission and the Metropolitan Water Sewerage and Drainage Board and implement their requirements and standards

- notify DASETT of any changes to the proposal that result in variations to impacts identified in the Notice of Intention

- on completion of the project, and to assist DASETT in monitoring the outcome of projects considered under the Act, notify it of:

  - any variations between predicted and actual impacts

  - the success in implementing the recommendations with details of any problems or discrepancies.

30. NSWDOP is currently conducting systematic hazard surveys and audits of all major hazardous installations in NSW. Initially it indicated to DASETT that such a survey/audit would be appropriate for MFF St Marys, particularly given the rapid development of nearby surrounding areas.

31. Defence met with NSWDOP in August 1988 to discuss its requirement for a hazard survey and audit. Subsequently a senior NSWDOP officer inspected the MFF site following which it was agreed that sufficient documentation on the previous MFF audit survey already existed and that the NSWDOP requirements had been met.

HERITAGE ASPECTS

32. In a submission to the Committee the Australian Heritage Commission stated that there are no places in the Register of the National Estate affected by the proposal. However, it indicated that it would welcome an investigation by Defence of the historic and scientific significance of any place associated with the MFF before any decision is made concerning their future. At the public hearing Defence indicated that it would undertake such a survey.

THE SITE

33. The proposed building site is within the MFF area approximately 2 km northwest of the main entrance within the shell section area. The specific siting will be in accordance with current standards and practices and is in accordance with the zoning provisions of the MFF master plan. The building site falls approximately 2 metres in a westerly direction and is partly covered with small trees and low scrub. The ground consists of moderately reactive clay soils. Defence advised the Committee that while the MFF site was subject to periodic flooding, damage was normally minor and limited to fences. The site of the shell filling facility is 9 metres above the 100 year flood line.

Committee's Conclusion

34. The site selected is suitable for the construction of a shell filling facility and is in accordance with NATO Safety Principles.

CONSTRUCTION DETAILS

Construction

35. Floor construction will consist of a reinforced concrete raft slab on compacted fill as the site foundation material consists of moderately reactive clay.

36. Walls generally will be of frangible construction consisting of stud walls lined internally with plasterboard or fibre cement sheet and clad externally with lightweight ribbed aluminium siding.

37. Walls surrounding the melt, pour and fill platforms will be constructed from reinforced concrete up to the level of the explosive melting area.

38. The following areas of highest risk will be contained in heavy reinforced concrete construction:

- unscrewing bay
- cavity bore bays
- test bay
- dust collection plant room.

39. Roof construction will be uniform throughout the building, comprising timber trusses supporting ribbed aluminium roof decking.

Materials and Finishes

40. Exterior materials and finishes will generally be as follows:

- roof - ribbed aluminium decking with natural finish
- walls - ribbed aluminium wall cladding with natural finish
  - concrete off-form with epoxy paint finish
  - polycarbonate sheet to windows (polycarbonate is plastic-type material used in place of glass to prevent hazards associated with glass fragmentation).

41. Interior materials and finishes will generally be as follows:

- floors - reinforced concrete with steel trowel finish and surface hardener
  - concrete off-form with epoxy paint finish
- ceilings - sealed and painted fibre cement sheeting
  - sealed and painted concrete off-form.

42. Floors to the tea room, laboratory and foreman's office will be finished with sheet vinyl. Floors to toilets will have ceramic tiles. Ceilings will be painted plasterboard.

Mechanical Services

43. The shell preparation area and the finishing and assembly area will be air-conditioned. Various ancillary rooms in the shell finishing sections will also be air-conditioned.

44. High temperature hot water from the central boiler house will be required to serve the process plant and will be utilised to provide air-conditioning heat requirements.

45. Mechanical ventilation will be provided to the pre-heating area, melt and fill areas, probing bays, the after cooling rooms and to the process plant room.

46. Compressed air will be reticulated throughout the facility to various process points. The following miscellaneous items will be installed:

- boiling water unit and refrigerated drinking fountain
- domestic hot water systems.

Electrical Services

47. Part of the existing 11 kV overhead line in the vicinity of the site will be replaced by an 11 kV underground service in compliance with regulations regarding overhead line clearances to explosives buildings.

48. Electrical installations will include the following:

- a new substation to feed the facility via a main switchboard and distribution boards
- lighting within the facility will generally be provided by dust ignition proof fluorescent fittings
- a static earthing and lightning protection system will be provided
- a diesel generator will be installed to provide emergency power for various process plant items in the event of power failure.

Hydraulic Services

49. Catch drains will collect stormwater runoff before discharging into an underground piped system. This system will also service runoff from the roof and paved areas. Collected stormwater will be piped to, and discharged through, headwells to the north and west of the development. Sewage will drain by gravity to a collecting well. It will then be pumped by rising main to the existing sewer.

50. Water will be provided by connection to an existing main while a new extension will be constructed to a point immediately north of the new facility and capped off. An offtake will be run around the development to provide for fire hydrants. A domestic service link along the access road will provide the building outlets as required.

51. Trade waste and contaminated washdown water will be collected in grated drains and directed to two sumps. Pumps will deliver the waste to a trade waste treatment works at the northern end of the facility. The treated trade waste will be discharged into the sewer.

Fire Protection

52. A wet pipe sprinkler system will be installed to protect the main two sections of the building. Handheld fire extinguishers will be supplied in plant rooms for mechanical and electrical fires. Fire hydrants will be provided around the external perimeter of the earth mounds.

Communications

53. Conduiting for telephones will be provided where required.

Security

54. The MFF area is patrolled by Australian Protective Services. Additional security provisions are not required for the shell filling facility.

Siteworks

55. Vehicular access will be via a new roadway which has entry and exit points from the existing roadway to the east of the proposed facility. Kerbing and guttering for the removal of stormwater will be provided where necessary.

56. The site will be cleared of existing vegetation prior to the commencement of construction. In order to limit damage from high velocity projectiles, earth mounds will be formed to separate the main two sections of the building and to shield adjoining areas. The trailing surface of the mounds will be grassed to prevent erosion. Disturbed areas of ground surrounding the development will also be grassed.

CONSULTATION

57. The following groups and organisations were consulted during the development of this proposal:

- Penrith City Council
- Blacktown City Council
- Department of Environment and Planning
- representatives or shop stewards from the following unions: AMWU, FIA, ASE, POA and APEA
- representatives from various sections of the MPF workforce.

CONSTRUCTION PROGRAM

58. Subject to Parliamentary approval, tenders will be called in 1988-89. It is anticipated that construction will take approximately 18 months to complete.

LIMIT OF COST

59. The estimated cost of the proposed work is $7.7m at April 1988 prices. New plant estimated to cost $6m will be installed during the building construction phase.

COMMITTEE'S RECOMMENDATION

60. The Committee recommends construction of the work in this reference at an estimated cost of $7.7m at April 1988 prices.

COMMITTEE'S CONCLUSIONS AND RECOMMENDATION

61. The conclusions and recommendation of the Committee are set out below with the paragraph in the report to which each refers:

		Paragraph
1.	There is a need to replace the existing shell filling facility at St Marys Munitions Filling Facility which has reached the end of its economic life and no longer meets current standards in relation to fume, dust and noise levels.	19
2.	The current facility does not meet NATO Safety Principles particularly in respect of safety distances to inhabited buildings.	20
3.	Following assurances from the Department of Defence and in view of the excellent safety record of the St Marys Munitions Filling Factory the Committee is satisfied that safety risks posed by the proposed facility are minimal.	27
4.	The site selected is suitable for the construction of a shell filling factory and is in accordance with NATO Safety Principles.	34
5.	The Committee recommends construction of the work in this reference at an estimated cost of $7.7m at April 1988 prices.	60

Colin Hollis
Chairman
9 March 1989

APPENDIX A

WITNESSES

HOROSCHUN, Mr Gerhard, Supervising Structural Engineer, Structural Dynamics, Australian Construction Services, Department of Administrative Services, Dickson, ACT

O'HARA, Mr Michael Anthony, Project Manager, Defence Central and Housing, New South Wales Region, Australian Construction Services, Department of Administrative Services, Chatswood, NSW

PAGE, Mr Darryl John, Acting General Manager, Munitions Filling Factory, Department of Defence, St Marys, NSW

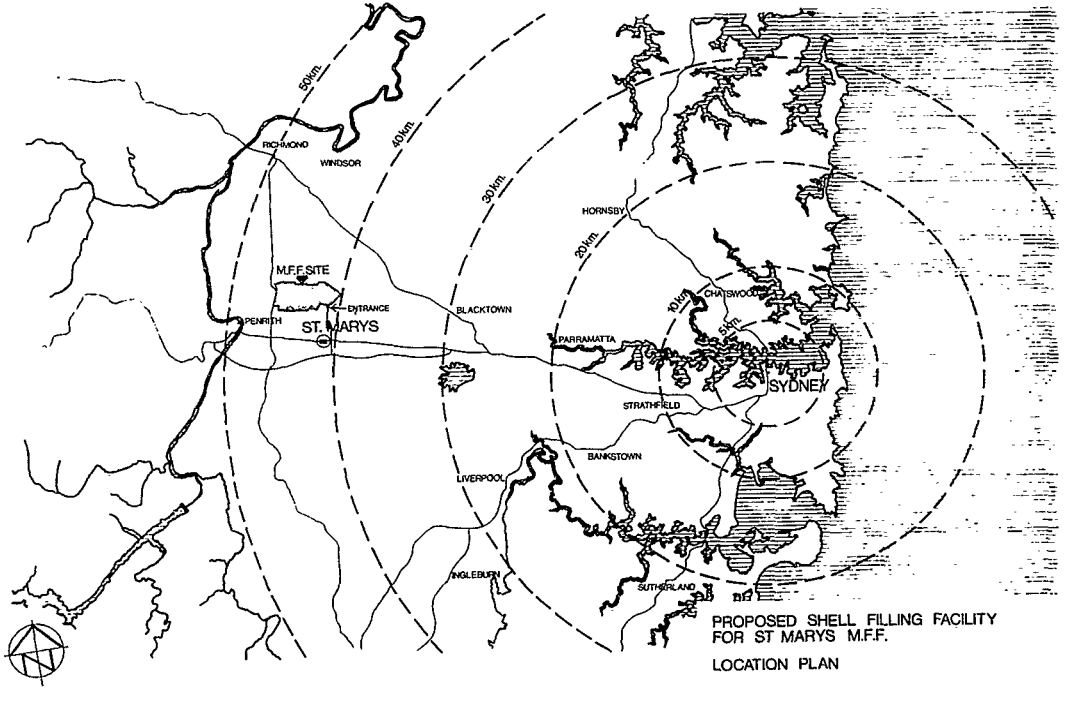
POWELL, Mr Arthur Douglas, First Assistant Secretary, Facilities and Property Division, Department of Defence, Canberra, ACT

ROSEN, Mr Robert Evan, Deputy State Manager, Projects Division 2, New South Wales Region, Australian Construction Services, Department of Administrative Services, Chatswood, NSW

VICKERY, Mr John Frederick, Manager, Technical Services and Quality, Munitions Filling Factory, Department of Defence, St Marys, NSW

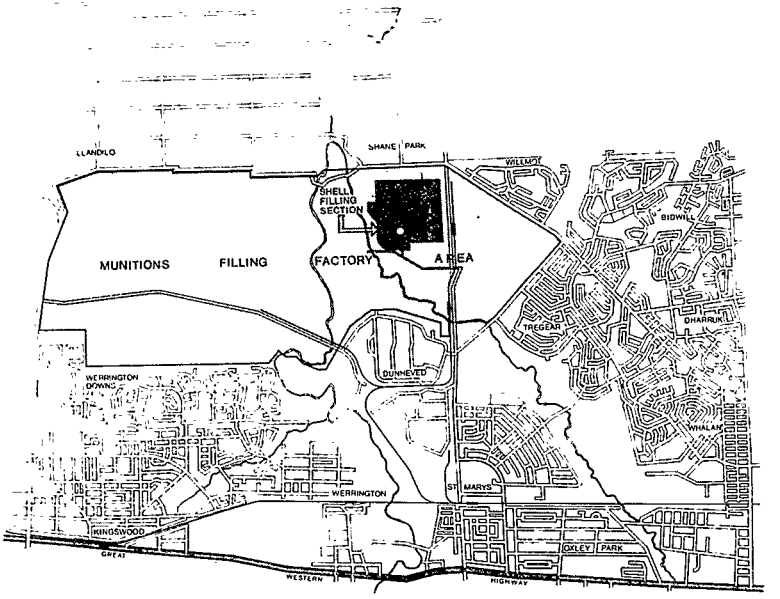
APPENDIX B

PROJECT PLANS AND DRAWINGS



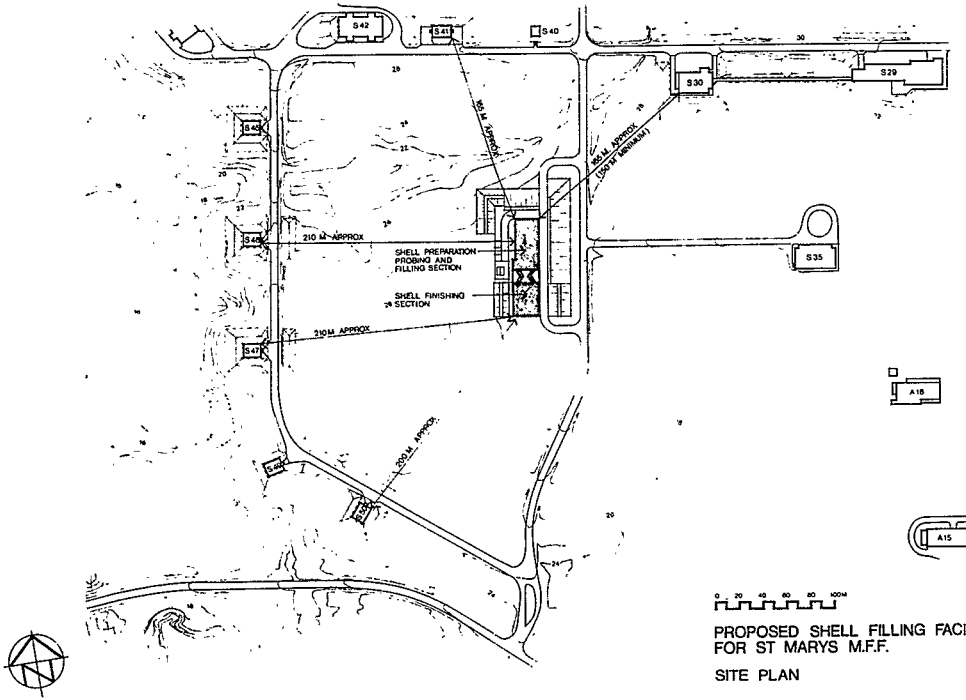
PROPOSED SHELL FILLING FACILITY
FOR ST MARYS M.F.F.

LOCATION PLAN



PROPOSED SHELL FILLING FACILITY
FOR ST. MARYS M.F.F.

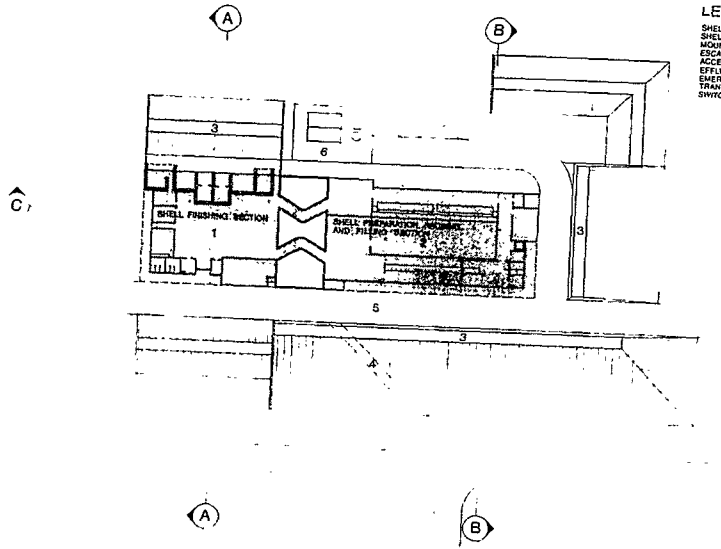
AREA PLAN



PROPOSED SHELL FILLING FACILITY
FOR ST MARYS M.F.F.

SITE PLAN

B3



B4

PROPOSED SHELL FILLING FACILITY
FOR ST MARYS M.F.F.

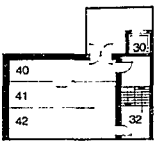
SITE LAYOUT

LEGEND
FINISHING SECTION

TEST BAY	1	PORCH	13
DUST COLLECTION PLANT	2	STORE	14
CAVITY BORE BAY	3	FEMALE TOILET	15
CAVITY BORE BAY	4	MALE TOILET	16
HYDRAULIC PLANT	5	STAFF AMENITIES	17
UNSCREW BAY	6	LABORATORY	18
ACCESS PASSAGE	7	TOP UP BAY	19
MOUND	8	VERANDAH	20
SUPPLY TUNNEL	9	FINISHING AND ASSEMBLY	21
TROLLEY RETURN TUNNEL	10	SHELL STORAGE	22
AIR CONDITIONING PLANT	11	BATTERY ROOM	23
OFFICE	12	SPRINKLER CONTROL ROOM	23A

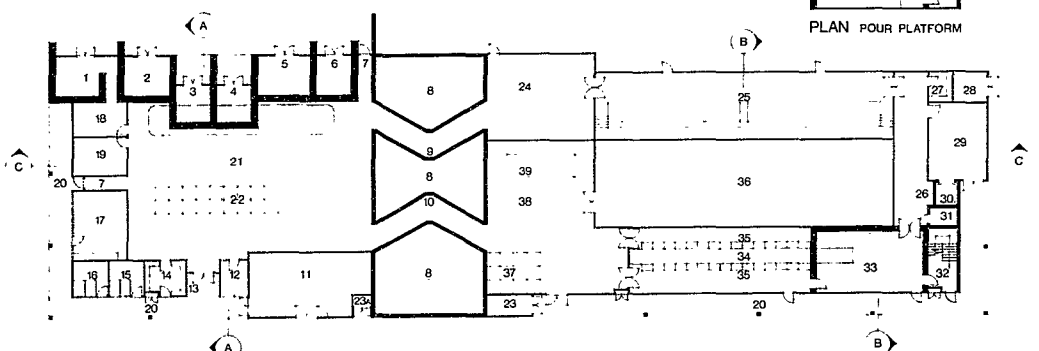
LEGEND
FILLING SECTION

AFTER COOLING AREA	24	PROCESS HEATING PLANT	36
PROBE AREA	25	SHELL STORAGE	37
FILLED SHELL PASSAGE	26	SHELL PREPARATION	38
STORE	27	WASHING MACHINE	39
DUST COLLECTION PLANT	28	DOLLY MELT	40
UNHEADING AREA	29	MELT PLATFORM	41
HOIST	30	VOID	42
HYDRAULIC PLANT	31	POUR PLATFORM	43
STAIR	32		
SHELL FILLING AREA	33		
PREHEAT TUNNEL	34		
TROLLEY STORAGE	35		



PLAN MELT PLATFORM

PLAN POUR PLATFORM

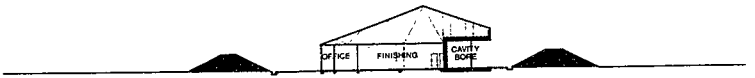


GROUND FLOOR PLAN

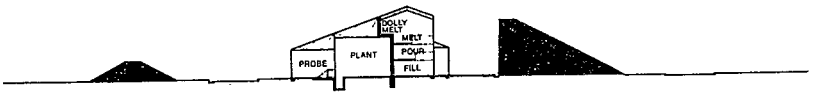
PROPOSED SHELL FILLING FACILITY
FOR ST MARYS M.F.F.

FLOOR PLANS

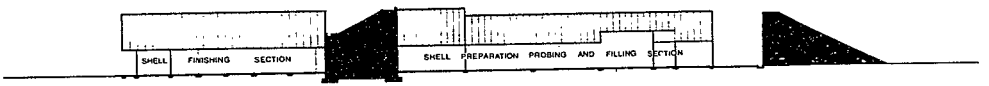
B5



SECTION A-A



SECTION B-B



SECTION C-C

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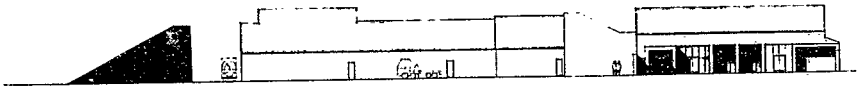
PROPOSED SHELL FILLING FACILITY
FOR ST MARYS M.F.F.

SECTIONS

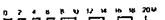
NORTH ELEVATION

SOUTH ELEVATION

EAST ELEVATION



WEST ELEVATION



PROPOSED SHELL FILLING FACILITY
FOR ST MARYS M.F.F.

ELEVATIONS