PART 2: COSTS AND ACHIEVEMENTS OF THE APPLIED RESEARCH FUND

2.1 This PART takes stock of the costs and achievements of the ARF (including the two predecessor schemes).

Parameters for appraisal of achievements

2.2 As mentioned in paragraph 1.6, the main objective of the ARF is to encourage technology ventures and R&D activities that have the potential to yield commercially exploitable results in Hong Kong, by providing government funding as a catalyst. The longer-term aim is to increase the technological capability and hence the competitiveness of local industry, thereby promoting high value added economic development in Hong Kong.

2.3 In 1992, the Industry Department developed the following parameters to evaluate the future performance of the ARDS which was then in the pipeline:

(a) number of applications received;

(b) number of worthwhile project proposals approved for funding support;

(c) amount of private sector R&D generated;

(d) intellectual property rights (e.g. patents and designs) developed;

(e) sales revenue attributable to new processes/products developed;

(f) direct financial returns of government investment;

(g) profits tax generated; and

(h) other spin-offs including R&D manpower trained, contract research work generated for universities and inward investment secured.

2.4 On the point of direct financial returns of government investment (i.e. item (f) above), the following events are relevant:

(a) ***Target return of 5% per annum.*** In seeking funds to set up the ARDS in December 1991, the Government informed the FC that funds disbursed under the ARDS would be regarded as government investment in the projects. Given the risk inherent in R&D, the Government was unlikely to be able to recoup its investment in all supported projects. However, the approach proposed should allow the Government to reap returns over and above its investment in successful projects. The Government would seek a return of **at least 5% per annum** on the sum advanced. The return would not necessarily be received on an annual basis and might accrue over a period pending the successful completion of some funded projects; and

(b) ***Seeking the best return rate achievable.*** In seeking the FC's approval for funding injection into the ARF in March 1998 (see para. 1.5), the Government informed the FC that the target rate of return of at least 5% for the ARDS should be dropped. The need to protect the seed capital and the requirement for a 5% return had created a hampering effect on the ARC in providing equity injection to approved projects because the return in the form of dividend was less certain. Consequently, most of the approved projects had been given loans with rather stringent conditions, such as guarantee requirements and interest at around prime rate. This had in turn a dampening effect on potential applications and the ARDS had therefore failed to attract quality applications. This inflexibility had a wider implication: the ARDS would not be able to achieve its public mission to facilitate more R&D activities and technology ventures in Hong Kong. The Government would ask the ARC to aim for **the best return rate achievable** from its investment as it, through the professional fund managers, worked within the parameters of the ARF's public mission**.** This would provide more flexibility in deciding the terms of the projects. The revised arrangement would provide an incentive for all parties involved, including the fund managers and the investee companies, to try to make the projects commercially viable and profitable. This in turn would help ensure that the best achievable rate of return was secured.

2.5 **The above events indicate that the Government recognised the risky nature of the investments. However, it also expected an investment return. This was originally set at "at least 5% per annum on the sum advanced". It was revised in March 1998 to "the best return rate achievable" because of the need to provide for flexibility.**

1998 review by the Industry Department

2.6 In 1998, the Industry Department reviewed the ARDS and the CARDS using the above parameters (see paras. 1.4 and 2.3). The review found that:

(a) the actual performance of the schemes had not been as impressive as they were originally envisaged. Nevertheless, they had filled a gap in providing a readily available source of finance for technology start-ups and upgrades;

(b) it was difficult to come to any definitive conclusion on whether the schemes had met their objectives;

(c) there were difficulties in obtaining from the investee companies commercial sensitive information such as sales revenue and profits tax. As a result, the review could not reliably assess the commercial viability of the new technology venture; and

(d) the use of civil servants working part-time as secretariat staff as well as fund manager, coupled with external assessors from the local academic community, was inadequate in the proper running of schemes of this nature. The schemes should be managed by full-time professional fund managers who had the experience and expertise in similar technology-related investments.

2003 review by the Applied Research Council

2.7 The CITB briefs the LegCo Panel on Commerce and Industry of the position of the ARF on a regular basis. In March 2002, the LegCo Panel expressed concerns about the investment losses incurred by the ARF both before and after the engagement of fund managers. To address such concerns, the ARC reviewed the ARF, focusing on its performance since the engagement of fund managers, the technology business and investment environment, and the role and future of the ARF. **In February 2003, the LegCo Panel was informed that the ARC considered that there should not be major changes to the present modus operandi, nor should the uncommitted funds be aggressively deployed.** The LegCo Panel was also informed that:

(a) as at 31 December 2002, the valuation of 21 investments managed by fund managers was $231 million, representing 67% of the approved funding of $346 million. Five of these investee companies were liquidated or sold at nominal value;

(b) among the remaining 16 active investments, one was listed on the Growth Enterprise Market in May 2002, another was acquired in February 2000 by a company listed in the Hong Kong Stock Exchange, and four had won prestigious technology awards either locally or overseas;

(c) the 16 active investee companies attracted investments amounting to about $870 million other than from the ARF. This represented a multiplier factor of roughly 3.2 against the corresponding approved investment from the ARC;

(d) 12 active investments were small and medium-sized enterprises with less than 50 employees at the time of first investment. Three of them had since gone beyond this employment level;

(e) the engagement of fund managers had enabled the ARF to attract more interest and investment than before when it was operated by civil servants. Before the engagement of fund managers, there were only 27 funded cases with funding support of $97 million over a period of six years. After their engagement, there were 17 cases with approved funding support of $311 million within the first two years;

(f) the engagement of fund managers was a major improvement. Although a number of investee companies did fail under financial austerity or adverse market conditions, the fund managers as a whole had been able to support the investee companies for technology and business development, providing the necessary networks and coaching. While the business and investment climate had been very difficult in the past two years or so, the ARF did represent a useful public policy tool which worthwhile technology ventures might turn to for investments and support; and

(g) in the light of the current business and investment environment for technology-based ventures, the ARC considered that there should not be major changes to the present modus operandi, nor should the uncommitted funds be aggressively deployed. However, it would continue to consider and explore potential opportunities and possible ways to improve the fulfilment of the ARF's public mission, albeit in the current difficult investment climate.

Options considered by the Applied Research Council

2.8 One month before reporting to the LegCo Panel, in January 2003 the ARC discussed the role and future of the ARF. The ARC noted that, if the existing modus operandi was to continue, the performance of the ARF would likely remain very sluggish in the foreseeable future, given the weak investment climate which might persist for some time. **The ARF would unlikely bring about local technology development opportunities with visibility or impact. It risked losing its purpose as a public policy tool to spearhead technology development.** Various options on the future positioning of the ARF were considered in an ARC discussion paper of January 2003, including the following:

(a) ***Discontinuation of the ARF*.** The current difficult investment climate did argue for the continued existence of government venture fund which worthwhile technology ventures might turn to when support was badly needed. The ARF

was part and parcel of the Government's integral public programme support (Note 3), the ultimate aim of which was to enhance the competitiveness of Hong Kong through technological development and upgrading. As such, the ARF was part of the total package essential to the development and spawning of technology ventures, and could leverage on private sector expertise under the existing modus operandi. The ARF had a continuous role to play in furthering and supporting innovation and technology development in Hong Kong;

(b) ***Extending the ARF's ambit to the Mainland or overseas.*** To address the lack of local quality investments, the ARF might consider investing in technology ventures elsewhere, so long as they had some connections with Hong Kong. This would arguably be able to enhance the quality, if not the quantity of technology investments in Hong Kong. This concept would be tantamount to the ARF investing on an extra-territorial basis. This was allowed under the existing modus operandi so long as the connections with Hong Kong had substantive technology development elements. However, it would not fulfil the ARF's mission if the connections with Hong Kong only related to setting up business headquarters, sales and marketing activities with main technology development activities being carried out extra-territorially;

(c) ***Funding external ventures to be set up in Hong Kong.*** The ARC might explore the feasibility of the ARF matching investments in external technology companies (say, from Silicon Valley), subject to a necessary condition that they should set up R&D or technology-related business operations in Hong Kong, for instance in the Science Park or Cyberport; and

(d) ***Co-fund with industrialists/financiers.*** The ARF might establish a fund, with matching contributions from a consortium of industrialists and/or financiers, for investment in technology ventures. The consortium would then manage the fund on behalf of the ARC with a management fee. A good consortium might have better feel of the technology market in the Mainland or in the region. However, this option might encounter similar issues concerning extra-territoriality as mentioned in (b) above. It might also give rise to concern that the consortium would put commercial consideration before public mission.

Note 3: *This refers to the Government's support for:*

(a) the development of generic, platform technology;

(b) university-industry collaboration in applied R&D;

(c) techno-entrepreneurship; and

(d) provision of infrastructure building and manpower training.

2.9 **In January 2003, the ARC agreed that the review of the ARF was an important issue which needed to be examined on an ongoing basis. The ARC would continue to review the ARF in the run-up to November 2004 in the light of the Government's overall strategy in supporting technology development.**

Audit assessment of the performance of the Applied Research Fund

2.10 Against the above background, Audit has recently assessed the performance of the ARF up to November 2003. The audit has focused on the following financial aspects of the performance:

(a) financial return of invested projects (see paras. 2.12 to 2.14);

(b) costs of operating the ARF (see paras. 2.15 to 2.17); and

(c) utilisation of available funds (see paras. 2.18 to 2.20).

2.11 In conducting the review, Audit is mindful of the fact that there are other non-financial objectives of the ARF, and that the achievements of the ARF should not be judged solely on the basis of financial performance. However, the fulfilment of those non-financial objectives is difficult to measure. Therefore, Audit has focused on those financial aspects of the ARF which can be measured objectively and which Audit considers are important by themselves.

Financial return of invested projects

2.12 ***Overall performance.*** Up to November 2003, the ARF had invested $461 million in 50 projects, including 26 completed projects and 24 active projects. As indicated in paragraph 2.5, the Government expected a financial return from the invested projects. Based on the latest valuation, however, the ARF investments overall suffered a capital loss of $247 million, or 54% of the sum invested. Table 1 shows that 32 projects suffered a capital loss to varying degrees, with many suffering a near total loss.

Table 1

Analysis of capital loss of invested projects

	Number of projects		Capital loss (Note) ($ million)
No loss	18		þ
Loss			
less than 50%	4		14
50% to 90%	10	32	87
91% to 100%	18		146
Total	**50**		**247**

Source: *ARC records*

Note: *The capital loss of $247 million included $107 million of realised loss for completed projects. The remaining $140 million were unrealised loss, representing the difference between the original investment value and the latest valuation of those projects not yet completed.*

2.13 ***Fund managers' performance.*** Fund managers have been engaged since November 1998 to improve the performance of the ARF (see para. 2.6(d)). However, the analysis in Table 2 shows that, in terms of capital loss, the performance of investments made after the engagement of fund managers has not improved.

Table 2

Performance of investments made before and after the engagement of fund managers

	Before	After
Number of investments	27	23
Amount of investments	$83 million	$378 million
Latest valuation	$41 million	$172 million
Percentage of capital loss	50%	54%

Source: ARC records

2.14 ***ARC comments.*** In response to the above audit findings, the ARC has informed Audit that:

(a) ***Prudence in valuation.*** The below-cost valuation is primarily due to prudence on the part of the fund managers in valuating the investments in view of the financial situation confronting some investee companies and the generally unfavourable investment climate worldwide for technology businesses in the past few years; and

(b) ***Global and industry context.*** The capital loss of ARF investments should be viewed in a wider global context. The financial return of the ARF is not immune to the rather soft technology investment market worldwide. The valuation of ARF investments, being 54% below its original cost of investment (see Table 2 in para. 2.13), is not out of line with the much more mature US venture capital market which shows a capital loss of about 38% (Note 4).

Note 4: *For instance, industry statistics of the US show that the three-year result of venture capital funds in the US formed in 1999 (roughly the time when the ARF started to be operated by venture capitalists) was that for every dollar investment, it gave a combined realised and residual valuation at only 62 cents. This effectively translated into a capital loss of about 38%.*

Costs of operating the Applied Research Fund

2.15 Apart from capital losses, it is important to take into account the costs of operating the ARF in assessing its performance. The costs to be taken into account should, for this purpose, consist of the following major elements:

(a) staff costs of the Secretariat of the ARC;

(b) the management fees paid to the fund managers since their engagement in November 1998; and

(c) other administration and operating expenses.

2.16 ***Audit findings*.** Audit found that, up to November 2003, the total operating costs of the ARF amounted to $127 million. This represented 28% of the $461 million investment made so far. Table 3 shows an analysis of the costs by the three major elements.

Table 3

Analysis of the costs of the Applied Research Fund (up to November 2003)

	$ million
Staff costs of the Secretariat (Note 1)	26
Management fees paid to fund managers (Note 2)	83
Other administration and operating expenses (Note 1)	18
Total	**127**

Source: *ARC records*

Note 1: *For the period from August 1992 (i.e. establishment of the ARC) to November 2003.*

Note 2: *For the period from November 1998 (i.e. when fund managers were first engaged) to November 2003.*

2.17 ***ARC comments.*** In response to the above audit findings, the ARC has informed Audit that:

(a) the structure of the management fees paid to fund managers has been revised from lump-sum fixed fees to performance-based fees;

(b) the effect is that the fees paid to fund managers gradually decreased from $44 million in the first two years to $39 million in the last three years; and

(c) it is estimated that the total management fees will further decrease to about $18 million in the coming four years if investments stay at the current level.

Utilisation of available funds

2.18 The ARF had an initial capital of $750 million. As at November 2003, it had a large cash balance of $434 million available for new investments. At a meeting with the ARC in December 2001, a fund manager indicated that:

(a) there was difficulty in identifying quality prospective investee companies in Hong Kong; and

(b) the venture capital industry was well developed in Hong Kong and there were abundant sources of venture capital.

2.19 ***Audit findings.*** Audit analysis of the trend of ARF investment indicates that the difficulty in identifying quality investee companies has remained. Only five new investments have been made since April 2001. Furthermore, no new investment has been approved since May 2003. Table 4 shows the details.

Table 4

Applied Research Fund investments from November 1998 to November 2003

Year	New investments		Follow-on investments (Note 1)		Total investments	
	(a)	(b)	(c)	(d)	(e) = (a) + (c)	(f) = (b) + (d)
	Number	$ million	Number	$ million	Number	$ million
1998-99 (Note 2)	5	95	〃	〃	5	95
1999-2000	8	96	3	21	11	117
2000-01	5	50	7	40	12	90
2001-02	1	8	5	22	6	30
2002-03	3	27	⊳	⊳	3	27
2003-04 (Note 3)	1 (Note 4)	5	1	14	2	19
Total	**23**	**281**	**16**	**97**	**39**	**378**

Source: ARC records

Note 1: These were follow-on investments made to existing investee companies.

Note 2: November 1998 to March 1999.

Note 3: April to November 2003.

Note 4: This was the latest new investment. It was approved by the ARC in April 2003.

2.20 ***ARC comments.*** In response to the above audit findings, the ARC has informed Audit that, taking a global perspective, the technology investment market has been soft in the past few years. For instance, statistics show that venture capital investment in the US slumped in 2003 to its lowest level since 1997. US$18 billion were invested in 2003, representing a decrease of 15% from the investment in 2002.

Audit observations

2.21 ***Capital losses and operating costs.*** The main objective of the ARF is to encourage technology ventures and R&D activities that have the potential to yield commercially exploitable results in Hong Kong. However, the audit findings indicate that many of the projects receiving ARF funds were commercially unsuccessful, and some had suffered heavy capital losses. Apart from the capital losses of $247 million in investments, operating costs of $127 million were incurred over the years.

2.22 ***Lack of worthwhile projects.*** The audit findings also indicate that there has been difficulty in identifying worthwhile projects for ARF investments. In this connection, a point made in the ARC discussion paper of January 2003 is worth noting. That is, maintaining the status quo of the ARF would "risk losing its purpose as a public policy tool to spearhead technology development". The ARC has considered various options to improve the situation, but none of them seems to offer a ready and viable solution to the existing problem. **The ARC has undertaken to continue to review the ARF in the light of the Government's overall strategy in supporting technology development (see paras. 2.8 and 2.9).**

2.23 ***Need for a comprehensive review.*** Audit welcomes the ARC's undertaking to continue to review the ARF. However, the ARF is part of the Government's innovation and technology programme and a range of infrastructure and other funding support is now offered for applied R&D activities under various government initiatives (see Appendix A). **As such, an overall review would go beyond the ARC's purview. Audit considers that the CITB needs to take the lead in the review. This would ensure that the review has a comprehensive coverage in the context of the Government's overall strategy for innovation and technology development.**

Audit recommendations

2.24 **Audit has *recommended* that the Secretary for Commerce, Industry and Technology should take the lead to critically review the role of the ARF. In performing the review, he should pay attention to the following:**

(a) **the heavy capital losses and the significant operating costs of the ARF;**

(b) **the lack of worthwhile and commercially viable projects that meet the public mission test for ARF support; and**

(c) **the availability of venture capital from other sources.**

Response from the Administration

2.25 The **Commissioner for Innovation and Technology**, on behalf of the CITB and the ARC, has said that they will keep the operation of the ARF under review to ensure its contribution to and alignment with the Government's overall strategy. This is in line with the audit recommendation in paragraph 2.24. He has also said that:

(a) ***Achievements.*** In assessing the performance of the ARF, due consideration should be given to its public mission and other indirect and wider benefits accrued from it. Since the engagement of fund managers in 1998, the ARF has been able to better benefit the industry through more venture funding, attract more co-investment from the private sector and, in certain specific cases, achieve important milestones like successful public listing or acquisition by publicly listed companies which have not been achieved before. Providing the necessary networks and coaching, the fund managers have been able to support the investee companies for technology and business development. These contributions are essential and have an impact, albeit difficult to quantify;

(b) ***New steering committee formed.*** The ARC has periodically reviewed the ARF in the past (the latest in January 2004) with the assistance of the Innovation and Technology Commission. In January 2004, the Secretary for Commerce, Industry and Technology briefed the LegCo Panel on Commerce and Industry on the strategic framework for innovation and technology development. As then announced, the Secretary has set up a Steering Committee on Innovation and Technology under his chairmanship. The Steering Committee comprises, among others, chairmen of the concerned technology support organizations of public policy programmes (including the Chairman of the ARC). It will, among other things, determine focuses and priorities of government innovation and technology programmes and ensure effective alignment, coordination and synergy among stakeholders. In this context, the Government will ensure alignment of the ARF with the overall strategy and programme in innovation and technology; and

(c) ***New strategic framework being formulated.*** Despite the growth of the venture capital industry in Hong Kong in the past decade, the ARF still has a public mission to fulfil in encouraging and providing funding support to technology ventures and R&D projects that have commercial potential. The Government is formulating a new strategic framework for further innovation and technology development. The framework will adopt a demand-led, market-driven approach. It will also identify technology focus areas where Hong Kong has competitive advantages for optimal use of resources, and will leverage on opportunities presented by the Pearl River Delta and the Closer Economic Partnership Arrangement between Hong Kong and the Mainland. With the new strategy, the role and contribution of the ARF are crucial and necessary to spur technology industry development.