



1. Project Data

Project ID
P091031

Project Name
IN: Industrial Pollution Management

Country
India

Practice Area(Lead)
Environment & Natural Resources

L/C/TF Number(s)
IBRD-79240,IDA-47550

Closing Date (Original)
30-Sep-2015

Total Project Cost (USD)
22,315,113.06

Bank Approval Date
03-Jun-2010

Closing Date (Actual)
31-Mar-2018

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	64,150,000.00	0.00
Revised Commitment	23,321,750.00	0.00
Actual	22,315,113.06	0.00

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2. Project Objectives and Components

a. Objectives

According to the Loan Agreement (LA, Schedule 1, pg. 8), the project development objectives (PDOs) were: (i) to build tangible human and technical capacity in selected state pollution control agencies of the Borrower for undertaking environmentally sound remediation of polluted sites; and (ii) to support the development of a policy, institutional and methodological framework for the Borrower to establish a National Program for the Rehabilitation of Polluted Sites. These objectives were stated slightly differently in the Project Appraisal Document (PAD, para. 17, pg. 15), but this did not alter them in terms of substance. This review will assess the project on the basis of the PDOs as stated in the LA.



The PDO was formally revised at the time of the third restructuring in May 2016 as follows: "to strengthen the capacity of selected state pollution control agencies in the remediation of polluted sites and to support development of a framework to establish a national program for the remediation sites." According to the respective Project Paper (pg. 2), the revision of the PDO was undertaken "to provide clarity and align with intended outcomes of the project" and , according to the ICR (para. 28, pg. 16) ensure that it was outcome-oriented.

b. Were the project objectives/key associated outcome targets revised during implementation?

Yes

Did the Board approve the revised objectives/key associated outcome targets?

Yes

Date of Board Approval

17-May-2016

c. Will a split evaluation be undertaken?

Yes

d. Components

1. Strengthening of Environmental Institutions: Building capacity for addressing pollution remediation (Appraisal Cost: US\$ 16.74 million; Actual Cost: US\$ 13.3 million, or 79.6 percent of the appraisal estimate). The objective of this component was to strengthen the institutional framework, including regulatory policies, management practices, and performance guidelines, for central an state agencies, supporting the remediation of polluted sites. More specifically, according to the respective Project Appraisal Document (PAD), it would assist the Government of India (GoI) in the development of improved policy and regulatory programs, technical trainings in targeted programmatic skills and associated institutional infrastructure investments and in the development of the National Program for Remediation of Polluted Sites (NPRPS), which will be implemented by the states. In doing so, it would support specialized state training programs, targeted technical assistance, and institutional infrastructure investments for effective implementation and monitoring of the remediation pilots and promote adoption of best practices and voluntary incentives for improved corporate environmental compliance with Hazardous Waste Management (HWM) rules.

2. Investments in Priority Remediation and Environmental Improvements: Rehabilitation of orphan hazardous waste sites and municipal dumpsites. (Appraisal Cost: US\$ 52.8 million; Actual Cost: US\$ 14.4 million, or 27.4 percent of the appraisal estimate due to the need to drop two of the four intended pilot remediation subprojects). The objective of this component was to pilot site remediation to minimize the environmental and health risks by containing the migration of the heavy metals and chemicals from contaminated soil and groundwater to acceptable and safe levels. More specifically, it would develop technical solutions designed to prevent unacceptable exposure risks by implementing measures



to intercept, contain, or treat as well as to monitor the environment and health impacts in the project area and prevent further migration of unacceptable contamination levels to sensitive areas and groundwater users.

The component would also assist Andhra Pradesh (AP) and West Bengal (WB) to develop and implement area-based plans that include remediation measures for "orphan" polluted sites -- i.e., sites contaminated by a release of hazardous substances that posed serious threats to human health or the environment -- and old municipal dumps together with measures for overall environmental improvements in the area and better compliance of the nearby industrial units. During implementation, it would provide technical assistance for a more detailed assessment and engineering design of site remediation plans, additional sampling and validation of pollution impacts, environmental audits, development of post-remediation monitoring and after-care plans for the project sites and training. with cleanup standards to be developed in accordance with intended land uses. Four pilot remediation sites in the two pilot states were included in the project's investment plan: (i) Noor Mohammed Kunta (NMK), Katedan Industrial Area (KIE) in Ranga Reddy District, AP (Appraisal Cost: US\$ 30.93 million); (ii) Dumpsite in Kadapa, AP (Appraisal Cost: US\$ 3.82 million); (iii) Dhapa old municipal dump site adjacent to East Kolkata Wetlands, WB (Appraisal Cost: US\$ 8.0 million); and (iv) Chemically contaminated site in the district of Hooghly, WB (Appraisal Cost: US\$ 10.06 million).

3. Project Management (Appraisal Cost: US\$ 5.85 million; Actual Cost: US\$ 2.9 million, or 50.3 percent of the appraisal estimate). The project would finance the incremental operating costs -- i.e., expenditures incurred by the Ministry of Environment and Forests (MOEF), the project implementing agency at the central government level and by the project states, where the site remediation activities would be the responsibility of the respective State Pollution Control Boards (i.e. APPCB and WBPCB) -- which would not have been incurred in its absence. These costs would include the hiring, operation, and maintenance of motor vehicles, equipment, and computer maintenance, office supplies, rent for office facilities, utilities, insurance, travel, honoraria for participating in meetings and Technical Evaluation Panel (TEP), where appropriate, technical reviews, outreach and communication, preparation of publicity materials, and per diem costs for technical staff carrying out training, supervisory, and quality control activities.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost: The project cost was decreased three times through restructuring. At the time of the first restructuring (December 19, 2013), it was reduced from US\$ 75.39 million to US\$ 65,424,490, with partial cancelation of the IDA credit (see below). The third restructuring (May 17, 2016), further reduced it to US\$ 51,284,490.48 as a result of the elimination of one of the four pilot subprojects and cancelation of part of the IBRD loan (also see below). The fourth restructuring (September 14, 2017), finally, decreased overall project cost to US\$ 30.71 million and canceled additional amounts out of both the IBRD loan and the IDA credit (see below). As a result, total project cost had fallen to 40.7 percent just of the amount estimated at appraisal. The main component affected by the overall reduction in project costs and financing was the second one for the pilot remediation projects, of which only two of the initially expected four were implemented, and only 27.4 percent of the originally estimated cost was incurred.

Financing: The project originally was expected to be financed by an US\$ 25.21 million IBRD loan and a US\$ 39.94 million IDA credit, for a total of US\$ 64.15 million. This total was revised downward three times with cancelation of part of the Bank financing each time. On December 19, 2013, US\$ 9.97 million of the



IDA credit was canceled at the time of the first restructuring due to savings accrued because devaluation of the Indian Rupee in relation to the US dollar according to the ICR(para 17, pg. 12). US\$ 10.5 million of the IBRD loan was canceled at the time of the third (Level 1) restructuring on May 17, 2016. This was due to the "savings from the dropping of the Hoogley Remediation Pilot in West Bengal, currency fluctuation and variation in costs for other subprojects," according to the respective Project Paper. The fourth restructuring on September 14, 2017 included cancellation of an additional US\$ 14,346,140.37 of the IBRD loan and US\$2,057,232 of the IDA credit. This additional cancellation was the result of the inability to proceed with the Noor Mohammed Kubnta (NMK) pilot subproject at Lake Hyderabad in Telengana state because, even though the bid process for the main dredging and containment activities had been finalized in July 2016, the contract could not be awarded because of a writ filed in the High Court of Telengana about some portion of the lake land. Thus, following the final restructuring, the value of the IBRD loan was US\$ 383,859.63 and that of the IDA credit was US\$ 17,149,268 -- meaning total Bank financing had fallen to US\$ 17,533,127.63, or just 27.3 percent of the original amount i.e., 1.4 percent of the IBRD loan and 67 percent of the IDA credit).

Borrower Contribution: The Gol counterpart funding as indicated in the PAD was US\$ 11.24 million. However, by the time of closing it had declined to US\$ 4.17 million according to the ICR, or 37.1 percent of the initially estimate amount.

Dates: As noted above, a first restructuring took place on December 19, 2013, but the closing date was not changed at that time. At the time of the second restructuring on August 25, 2015 the original project closing date (September 30, 2015) was extended by nearly two years to September 15, 2017. According to respective Project Paper, this extension was required "due to delays caused by the administrative uncertainties arising from the bifurcation of the state of Andhra Pradesh (June 2013 to September 2014) and unique nature of subprojects." The fourth restructuring (September 14, 2017) further extended the closing date for six months to March 31, 2018. According to the corresponding Project Paper, this additional extension was needed "for completion of activities that are already committed (more importantly, the two ongoing remediation pilot sub-projects)...and reassessment of fund requirements for completion of ongoing activities, that ensure achievement of PDO." Project implementation, therefore, took two and a half years longer than originally anticipated.

3. Relevance of Objectives

Rationale

Both the original and revised project objectives and design were of high relevance at the time of appraisal and continue to be so at present since the problems it sought to address persist in many parts of the country. According to the ICR (para 32, pg. 17), the project was "aligned with the GOI's 11th five-year plan (2007-2012) objectives of 'environmental sustainability by addressing issues of environmental governance and pollution control'." It added that "to achieve these objective and encouraged by the initial progress of the project the Gol initiated scale-up measures for remediation...in 2012. This involved the preparation of remediation plans for 10 contaminated sites in the country, to be implemented in collaboration with the respective state governments and the private sector." India's most recent five-year plan covered the period 2012-17, but did not specifically identify environmental sustainability among its broad objectives although it



did include development of a National Action Plan for Climate Change to achieve a target of 20% to 25% reduction in emission levels by 2020 as one of its "growth indicators." The World Bank Group (WBG) Country Assistance Strategy (CAS) for India for FY09-12, in turn, observed (pg. 9) that "environmental problems, particularly urban and indoor air pollution, industrial and toxic contaminants, and lack of water supply, sanitation and hygiene are associated with increased morbidity and mortality and reduced productivity." It also mentioned (pg.31), that at the sector level, WBG support would "continue to concentrate on infrastructure (transport, power, urban development, urban and rural water supply and sanitation, irrigation, and water resource management." The Gol's Five Year Plan for 2012-2017 and the Bank Group's CPS for 2013-2017 reasserted this priority. In addition to being linked to the transformation pillar of the CPS that emphasized environmental and natural resource management improvement, the associated Results Framework included specific indicators on piloting remediation technologies. The most recent WBG Country Partnership Framework (CPF) for India (FY18-FY22) identifies as one of its three focus areas "resource efficient growth" which includes as two of its five subareas: (i) improving living conditions and sustainability of cities and (ii) improving management systems for controlling air pollution (Figure 4, pg. 14). With regard to the first of these areas it states (para 32, pg. 15) "the WBG will help cities become more green, livable, productive, and resilient by [*inter alia*] mobilizing the private sector to address issues in municipal waste management, wastewater recycling and reuse, [etc.]" and in relation to the second it affirms: "air pollution has emerged as an urgent development concern with widespread health impacts and the government's Clean Air Program (NCAP) provides an important entry point for the WBG's engagement." In addition, the Systematic Country Diagnostic (SCD) completed prior to and as a basis for the new CPF observes (pg. 30) a section with the title "Reducing Risks" that "hazardous contaminated waste sites in potentially valuable locations in cities are another symptom of suboptimal land use. Some estimates suggest that India has about 300,000 contaminated sites spread across 60,000 hectares of urban land [and specifically cites this project in this regard in a footnote], ranging from a few acres to over 300 acres each." These carry a high opportunity cost in terms of the benefits foregone by not using this land for recreational, commercial, or residential use, especially in congested urban areas. Pilot projects in Mumbai and Delhi suggest that the economic returns of remediation outweigh the costs by several orders of magnitude." The intended outputs, outcomes, and associated targets were reasonable given the resources to be mobilized by the project and the capacities of the agencies involved. However, when the Rupee was subsequently devalued in relation to the US dollar and implementation of half of the pilot remediation subprojects proved to be impossible even within the project's extended time frame, a significant share of the original Bank financing needed to be canceled.

Rating

High

4. Achievement of Objectives (Efficacy)

Objective 1
Objective



To build tangible human and technical capacity in selected state pollution control agencies of the Borrower for undertaking environmentally sound remediation of polluted sites.

Rationale

Intended Outputs (based on the original Results Framework in the PAD) **and Actual Outputs:**

1. Technical staff of state Pollution Control Boards (PCBs) trained to supervise the implementation of remediation plans and monitor area environmental conditions. This indicator was dropped at the time of the May 2016 Level 1 restructuring because it was similar to the new PDO indicator "Capacity of technical staff of the participating agencies strengthened to prepare, implement, and monitor remediation plans." However, it was achieved.
2. Good practice notes on site rehabilitation disseminated to the state PCB network; conduct knowledge dissemination events sponsored by the MoEF in selected states. This indicator was dropped at the time of the Level 1 restructuring because it reflected "an activity and not an output" according to the respective Project Paper (pg. 7).
3. Area-based remediation plans demonstrating effective technologies for pollution reduction under implementation in West Bengal (WB) and Andhra Pradesh (AP). This indicator is not mentioned in the revised Results Framework in the Project Paper for the Level 1 restructuring, but such plans were developed for three of the pilot sites and two of them were implemented. Thus, it was partly achieved.
4. Pollution hazards reduced to acceptable level using remediation/containment technologies at two pilot HW sites. This indicator is also not mentioned in the Project Paper for the Level 1 restructuring, which instead cites one that states "The extent of indiscriminate disposal of hazardous wastes in the pilot states drastically diminished and verified through an end of project beneficiary survey." However, it was dropped at the time of the restructuring because "activities related to this indicator have not been included in the project," according to the respective Project Paper (pg.8).
5. Measurable improvements of the environmental conditions around old dumpsites in two states monitored by the State Pollution Control Boards (SPCBs). This indicator is not mentioned in the Project Paper for the Level 1 restructuring although the project did successfully implement remediation activities at the two pilot municipal dumpsites.
6. Post-remediation monitoring system with appropriate infrastructure and agreed indicators established at three remediated sites by the end of year 4. This indicator appears to have been replaced prior to the Level 1 restructuring by one reading "Community monitoring implemented in two states." However, it was dropped at the time of the restructuring because "activities related to this indicator have not been included in the project."
7. Environmental and social assessments acceptable to the Bank carried out and disclosed for pilot projects implemented in year one and two prior to negotiations. This indicator is not mentioned in the Project Paper for the Level 1 restructuring, but was achieved, although there may have been delays in doing so
8. Involvement of local authorities and neighboring communities and level of support to rehabilitation of sites. This indicator was likewise not mentioned as such in the Project Paper for the Level 1 restructuring, except perhaps in reference to the community monitoring indicator mentioned above, which was dropped at that time.

Intended Outcomes (based on original Results Framework in the PAD) **and Actual Outcomes:**

1. Clean up/remediation technologies have been piloted at orphan hazardous waste sites and municipal dumpsites in selected states and a network of state Pollution Control Boards (PCBs) established by the



Ministry of Environment and Forests (MoEF) based training. This outcome, as stated, was dropped and replaced by one stating "Contaminated land managed or dump sites closed under the project (ha)," which had previously been an intermediate outcome indicator. However, the initial target of two pilot hazardous waste and two municipal dumpsites to be remediated was only met in part, as only the two municipal dumpsites were largely remediated by the time the project closed (and this process was completed subsequently) but the two pilot hazardous waste sites were not remediated.

2. Guidelines and standards for remediation developed and supervisor capacity of technical staff at environmental agencies to implement remediation plans and monitor environmental conditions strengthened. This outcome was revised at the time of the Level 1 restructuring to read "Capacity of technical staff of the participating agencies strengthened to prepare, implement, and monitor remediation plans," which was considered to be more outcome-oriented. It was achieved.

3. An Environmental Compliance Assistance Center (ECAC) has been established and fully functional by the end of year two in West Bengal (WB) and by end of year four in Andhra Pradesh (AP). This outcome was not achieved as this subcomponent was dropped at the time of the May 2016 restructuring because it was "not critical for achieving the PDO and the MoEF&CC (Ministry of Environment, Forests, and Climate Change) also decided against establishing such centers," according to the ICR (para. 23, pg. 13).

4. Water quality and soil characteristics at the pilot sites comply with specified standards and mechanisms established to monitor in the long term. This outcome was also dropped at the time of the Level 1 restructuring and replaced by "core" outcome indicators for the total number and female share of project beneficiaries.

In summary, based on the above assessment of project performance in relation to the outcome and output indicators contained in the original Results Framework included in the PAD, achievement of this objective can be considered Modest. As indicated in the ICR (para. 37, pg 18), achievements included: (i) remediation of two of the originally planned remediation sites (both municipal dumps); (ii) establishment of a network of SPCBs for knowledge dissemination; (iii) project-based training; (iv) development of guidelines and standards for remediation; and (v) strengthening of supervisory capacity of selected state environmental agencies to implement remediation plans and monitor environmental conditions. However, the support for the two state ECACs was dropped and thus this originally intended outcome was not achieved.

Rating
Modest

Objective 1 Revision 1

Revised Objective

To strengthen the capacity of selected state pollution control agencies in the remediation of polluted sites.

Revised Rationale

According to the respective Project Paper (pg. 5), "the original PDO is long with the focus on activities (such as 'to build') and includes outcomes that are inherently difficult to assess (such as 'tangible,' 'environmentally



sound,' and 'Rehabilitation')." Revisions were made to drop these terms and have a clearer and outcome focused PDO.

Outputs (based on revised Results Framework)

1. Inventory of polluted sites in India was developed and the data base was installed at MoEF&CC for future updating.
2. Methodologies for remediation of polluted sites were developed and will serve as the basic technical guidance document for the development of remediation plans for future remediation activities by MoEF&CC and the states.
3. National guidelines for the remediation of polluted sites were developed.
4. Policy options for remediation of polluted sites were developed based on a review of existing legislation and international experience. According to the ICR (pg. 40), this target was exceeded as not only was the policy options report finalized but draft rules for remediation of contaminated sites were also developed.
5. Number of parameters that can be analyzed by the laboratories of Andhra Pradesh, Telengana, and West Bengal increased from a baseline of 26 to a total of 76, which was the project target.
6. Outline of State Pollution Control Board network for remediation was established at the project's website, which, according to the ICR (pg. 40), "helped building knowledge of other pollution control boards in the area of remediation."
7. Remediation plans were prepared based on risk-based approach and ready for implementation in all three participating states. 15 remediation plans were prepared and are ready for implementation in the three participating states.
8. Post-remediation monitoring system with appropriate infrastructure and approved indicators was established for three remediation sites by the completion of remediation works. According to the ICR (pg. 41), the post-remediation monitoring infrastructure was established and monitoring for approved indicators would be initiated through skills developed through laboratory strengthening. However, since one of the pilot sites had to be dropped after the restructuring, this refers only to two sites. Thus, this target was 66.7 percent achieved.
9. People with reduced direct exposure to pollution from sites remediated by the project. According to the ICR (pg. 42), this indicator was achieved in relation to the revised target of 17,238, which refers to the number of people within 3 km of the pilot project sites. However, only 61 percent of the original revised target (28,238) was achieved due to the reduction in pilot sites from three to two following the restructuring.

Outcomes (based on revised Results Framework):

1. 16.30 hectares (ha) of contaminated land managed or dump sites closed. According to the ICR (pg. 37), "minor support activities such as compound wall, electrical works, etc." were still underway at the time the project closed, but were subsequently completed.
2. Capacity of technical staff of the participating agencies was strengthened to prepare, implement and monitor remediation plans. According to the ICR (pg. 37), the target for this indicator was exceeded as "23 remediation plans (15 through project financing and 8 through Gol funds) were developed, implementation of 2 remediation plans was completed, post-remediation plans were developed and laboratory capacity was developed in three sites," indicating preparation of 8 additional remediation plans, development of monitoring capacity in one additional state (Telangana) and capacity development at Central Pollution Control Board.
3. Total project beneficiaries -- the revised target (157,362) was met.
4. Share of female beneficiaries -- the original and revised target (which did not change) (45.34 percent) was also met.



In summary, this revised objective was largely achieved. However, there was a shortfall with respect to the revised expected number of pilot remediation sites and associated post-remediation monitoring activities, which decreased from 3 (at the time of restructuring) to 2 on completion as it proved not to be possible to proceed with implementation of the remediation plan for the third site even during the extended project time horizon due to a land-related dispute not anticipated at appraisal.

Revised Rating
Substantial

Objective 2

Objective

To support the development of a policy, institutional and methodological framework for the Borrower to establish a National Program for Rehabilitation of Polluted Sites (NPRPS).

Rationale

Intended Outputs (based on the original Results Framework in the PAD) **and Actual Outputs:**

1. Methodological guidelines for risk assessment, prioritization, and plans for remediation of polluted sites are in place to support the preparation of NPRPS. This, in turn, would involve three specific indicators: (i) guidelines and standards for remediation developed and adopted by participating states and the Ministry of Environment; (ii) analysis of existing environmental legislation related to liability and international experience on remediation of contaminated sites and formulation of policy framework; and (iii) development of procedure for remediation orders for "orphan" and "non-orphan" sites which pose urgent risk to human health and environment. These activities and products were developed.

Intended Outcome (based on the original Results Framework in the PAD) **and Actual Outcome:**

1. Supporting NPRPS by developing methodological framework for inventorying polluted sites, establishing remediation procedures and solutions and engaging multiple stakeholders in the implementation, including cost recovery mechanisms. This was largely achieved, although it is not clear whether cost recovery mechanisms were included.

In summary, this objective appears to have been largely achieved as, according to the ICR (para. 37, pg. 18), "methodological framework, procedures and solutions and stakeholder engagement in implementation to support NRPRS" was "completed."

Rating
Substantial

Objective 2 Revision 1

Revised Objective

To support development of a framework to establish a national program for the remediation of polluted sites.

Revised Rationale



According to the respective Project Paper (pg. 5), "the original PDO is long with the focus on activities (such as 'to build') and includes outcomes that are inherently difficult to assess (such as 'tangible,' 'environmentally sound,' and 'Rehabilitation')." Revisions were made to drop these terms and have a clearer and outcome focused PDO.

Intended Outputs:

Outputs (based on the revised Results Framework):

1. National guidelines for the remediation of polluted sites were developed. More specifically, Guidelines on Implementing Liabilities for Environmental Damages to Handling and Disposal of Hazardous Waste and Penalty were issued in January 2016 and Remediation of Contaminated Sites Rules in 2017.
2. Methodologies for remediation of polluted sites in India were also developed.

Outcomes (based on the revised Results Framework):

Framework for the establishment of the National Program for Remediation of Polluted Sites (NPRPS) comprising inventory of polluted sites, remediation methodologies and policy and regulatory reviews development: the Final Framework was developed and the Technical Review Committee recommended "Rules for Remediation of Contaminated Sites for Approval by the Ministry of Environment, Forests, and Climate Change (MoEF&CC), together with a National Action Plan for Chemicals Management, and Soil Standards for Remediation.

In summary, this revised objective was exceeded. The ICR states, for example (para. 53, pg, 21), "realizing the importance of the remediation program and the need for additional activities in the area, the MoEF&CC requested for inclusion of activities to (a) support studies for the development of soil standards in India; (b) engage academic institutions for research and capacity-building activities on remediation; (c) develop a management plan for use of industrial chemicals, and (d) expand the waste management information system. These activities had not been part of the original project design but were added at the time of the May 2016 Level 1 restructuring and the MoEF&CC drafted a national action plan for chemicals management and soil standards by March 2018.

Revised Rating

High

Rationale

On balance, the project substantially achieved its original and revised intended outcomes and objectives. Its only significant shortfall involved its inability to implement two of the four pilot remediation subprojects, although it did successfully prepare remediation plans for three of the four, and achieved its capacity building objectives adding one state to the two that it was originally expected to benefit in this regard. While achievements prior to the third (Level 1) restructuring in May 2016 were Modest, those which followed it were Substantial to High, even exceeding what had initially been expected in some respects.

Overall Efficacy Rating

Substantial



5. Efficiency

The economic analysis carried out in the PAD was indicative and essentially consisted of a cost-benefit analysis of two of the four proposed pilot remediation subprojects (NMK Lake and the Kadapa dumpsite), which demonstrated positive returns (i.e., Benefit-Cost ratios of 1.28 and 1.65, respectively, although Internal Rates of Return per se were not presented). However, the first of these two subprojects later had to be dropped at the time of the Level 1 restructuring and thus was not implemented under the project. As a result, the ICR reiterated this analysis for the dumpsite as well as for the second one actually implemented using the same assumptions applied at appraisal, again finding positive net present values (NPVs) and affirming (para. 56, pg. 22) that if benefits and costs unforeseen at appraisal were taken into consideration, these values would be even higher. An estimate of the benefit cost ratio for the investment component (i.e., the two remediation pilots) was undertaken at the time of the fourth restructuring in September 2017 and again replicated for the ICR with slightly less positive -- but nevertheless acceptable -- results due to the use of actual, rather than assumed, employment generation and Greenhouse Gas reduction data. In addition, unlike the PAD, the ICR performed a cost-benefit analysis for the project as a whole based on the actual cost of contracts, GHG reduction estimates calculated by remediation consultants, results of an independent social audit, data from the Social Management Plan, laboratory equipment utilization reports from the two state PCBs, and information on the cost of remediation for eight CPCB sites. This analysis yielded an Internal Rate of Return (IRR) of 36.78 for the investment component and 26.12 for the project as a whole, again a very positive result. The ICR also considered both design and implementation efficiency, observing in relation to the former (para 59, pg. 23) that, *inter alia*, the project "resulted in preparation of draft rules for remediation and soil standards, strengthened analytical and monitoring capacity of all the three participating states for HWM, and demonstration of remediation of polluted sites at two of the four site envisaged at appraisal." As concerns the latter, it acknowledges (para. 60, pg. 23) that implementation required 30 months more than initially expected due to "delays in decision making, approval of remediation plans, bifurcation of Andhra Pradesh state, procurement delays, and other implementation challenges." Despite these delays, due to the overall positive IRR and substantial economic, including public health, benefits generated by the project, Efficiency is rated Substantial

Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	0	51.60 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	36.78	100.00 <input type="checkbox"/> Not Applicable



* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

The Relevance of project objectives is rated High, while Efficiency, and Efficacy in relation to the project's revised PDOs are both rated Substantial and that in relation to its original PDOs is rated Modest. Weighting the Efficacy ratings by the share of total actual disbursements before and after the Level 1 restructuring, as indicated, in the table below, results in an overall outcome rating of Moderately Satisfactory. This rating mainly reflects the fact that two of the four initially planned pilot remediation sites, including both of those for industrial hazardous wastes (as opposed to municipal dumpsites) could not be implemented, while the project did successfully strengthen institutional capacity in relation to hazardous waste management both at the central government and selected state (3 instead of the initially expected 2) levels.

Criterion	Before Restructuring	After Restructuring
Relevance of the Objective	High	High
PDO Efficacy	Modest	Substantial
Strengthen Capacity of State Pollution Agencies	(Modest)	(Substantial)
Support for development of a framework for the NPRPS	(Substantial)	(High)
Efficiency	Substantial	Substantial
Outcome Rating	Moderately Unsatisfactory	Satisfactory
Numerical Value of the Outcome Rating	3	5
Disbursement (US\$ million)*	9.95	12.33
Share of Disbursement (%)	44.6	55.3
Weighted Value of the Outcome Rating	1.34	2.77

Overall Outcome Rating = Moderately Satisfactory (1.34 +2.77 = 4.11)

*Figure based on actual total disbursements of US\$ 22.31 million indicated in the ICR (Table 3, pg. 24)

a. Outcome Rating

Moderately Satisfactory

7. Risk to Development Outcome

The risk to development effectiveness does not seem to be significant. The capacity building benefits generated by the project, including those related to both remediation and environmental monitoring, at both the central and state government levels are likely to persist, and the CPCB is reportedly committed to proceed with the remediation of 10 other contaminated sites elsewhere in the country in part as the result of "considerable



pressure from the public and the Supreme Court on the regulatory bodies to strengthen [the] legal and enforcement regime," according to the ICR (para. 108, pg. 33). Indeed, addressing pollution -- especially urban air pollution -- is presently a high government priority in India, and public awareness is high.

8. Assessment of Bank Performance

a. Quality-at-Entry

The project -- especially for the pilot remediation investment subprojects -- was not fully ready for implementation. This was the most significant quality-at-entry issue and was primarily due to incomplete understanding at the time of appraisal and approval regarding the nature of the four pilot sites proposed to be remediated (which had been identified in advance) and the technical complexity and requirements of doing so. The institutional weaknesses of the state implementing agencies, which were regulatory rather than contaminated site remediation bodies, were also underestimated by the Bank. These were the main reasons for the significant delays in project implementation (together with the unanticipated -- and probably unanticipatable -- division of the pilot state of Andhra Pradesh into two). Thus more time and effort should have been devoted to pilot subproject preparation prior to appraisal and approval. The land dispute which later resulted in the need to drop one of the pilot projects could also been anticipated had greater attention been given to this risk during preparation. These shortcomings notwithstanding it is to the Bank's credit that it agreed to help the Government tackle a very complicated issue -- hazardous waste management -- and the approach followed, including the piloting of remediation subprojects to gain experience and for future demonstration purposes was an appropriate one.

Quality-at-Entry Rating
Moderately Unsatisfactory

b. Quality of supervision

There were an average of two supervision missions per year, mainly staffed by specialists from the Bank office in New Delhi. The Bank responded well to the implementation delays and problems experienced by the project, although this required four, including a Level 1, restructuring. This included adjusting both the PDO, project components, and the original Results Framework to make it more outcome focused and easier to monitor, as well as extending the project closing date for a total of 2.5 years. The Bank also provided needed technical and procurement support to the Borrower that in and of itself contributed to strengthening the capacity of the three participating State Pollution Control Boards. While the project had three TTLs, transition among them did not present problems, and reporting throughout project implementation was candid.

Quality of Supervision Rating
Satisfactory



Overall Bank Performance Rating

Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

Project M&E arrangements were generally adequate although some changes needed to be introduced into the Results Framework at the time of the Level 1 restructuring in May 2016. According to the ICR (para. 87, pg. 29), these alterations "helped in monitoring, analyzing, and reporting on various capacity building activities of the project." The project design also included a dedicated M&E specialist in the project team at the CPCB. However, the ICR does not describe the M&E arrangements in detail.

b. M&E Implementation

The revised Results Framework reportedly resulted in "better management of project outcomes, that eventually helped in tracking benefits due to capacity building activities in the project: (ICR, para, 87, pg. 29). It also affirmed that the environmental and social assessment, together with the detailed design reports for remediation and NGOs implementing the project's social management plans were "creatively used to generate baseline and data on outcomes and results," while a social audit collected "impact data" for the two remediated sites.

c. M&E Utilization

M&E data was reportedly (ICR, para 88, pg. 29) used for decision making, including revision of the original Results Framework. It also states that it informed decision making for the "periodic cancellations that were required for the restructurings in the context of achieving project outcomes." However, it does not explain how this was the case, since other than for the initial cancellation of IDA resources that the ICR attributes to devaluation of the Rupee in relation to the US dollar, the other cancellations were due to the project's inability to implement two of the originally planned pilot remediation subprojects.

M&E Quality Rating

Modest

10. Other Issues

a. Safeguards

This project was appropriately classified in Category A due to the substantial potential environmental and social impacts associated with the remediation of contaminated sites and initially triggered four safeguard



policies: OP 4.01 (Environmental Assessment), OP 4.04 (Natural Habitats); OP 4.11 (Physical Cultural Resources); and 4.12 (Involuntary Resettlement). An Environmental and Social Management Framework (ESMF) was elaborated during preparation and Environmental and Social Assessments (ESAs) and associated Environmental and Social Management Plans (ESMPs) were subsequently prepared for each of the four pilot remediation subprojects. While no land acquisition or resettlement issues were identified during implementation of the two pilot subprojects, potential livelihood losses by rag-pickers and local pig raising communities required the implementation of specific social management plans (SMPs). In addition, while the Indigenous Peoples (IP) (OP 4.12) was not triggered during preparation -- although the reason for this is not clear -- it was triggered at the time of the May 2016 restructuring because rag-pickers at the Kadapa waste disposal site belonged to the Scheduled Tribes category, which can be considered indigenous peoples under this OP. While this delayed start of the associated remediation project, according to the ICR (para. 93, pg. 30), "due process of OP 4.10, including conducting Free, Prior, and Informed (FPIC) consultations with the indigenous people was followed as part of the ESA and an acceptable livelihood support program for affected families dependent on the landfill site was developed and thereafter implemented." It also states that the subsequent social audit report found that "the counselling and awareness sessions on health, hygiene, alternate vocations, and sending children to school" were "very useful." However, it also indicated that the vocational training activities were not able to ensure "sustainable income due to poor market linkages of the products." While not explicitly saying that the environmental and social safeguard policies were fully complied with, it implies this by stating that the project's performance in this regard was rated Satisfactory (para. 94, pg. 31).

b. Fiduciary Compliance

Financial Management was rated largely Satisfactory throughout project implementation, although there were minor delays in the submission of audit reports by the MoEF&CC and the position of financial management consultant was vacant for three years, which caused coordination issues between the Ministry and the participating states. While there were some delays in the flow of funds from the Ministry, federal and state counterpart resources were provided on schedule and the SPCBs submitted interim financial and audit reports in a timely fashion and staffing arrangements at the state level were adequate. The external audits by a firm of chartered accountants were unqualified and the internal auditors in the PCBs reviewed project transactions annually and found no significant accounting or internal control issues.

Procurement was rated Moderately Unsatisfactory during most of the project. Staffing for procurement and project management more generally in the MoEF&CC was a persisting problem. While staffing per se was not an issue at the state level, the procurement staff lacked prior experience with civil works and this resulted in considerable delays and a number of false starts with respect to the bidding for remediation activities. The ICR (para 98, pg. 32) concluded that the project would have benefitted "if the readiness of the remediation projects in terms of design and civil works procurement capacity had been developed during preparation," which corresponds to an important lesson from this operation more generally.

Governance and Accountability Action Plan. During preparation a GAAP was established and agreed with the implementing agencies and the GoI. According to the ICR (para. 99, pg. 32), this plan was monitored and reported on during implementation and "broadly complied with," but despite this, "some complaints related to



contract management were received by the World Bank. While the ICR does not indicate what these complaints were or their outcomes, it observes (in a footnote) that they were referred to the Integrity Vice Presidency (INT).

c. Unintended impacts (Positive or Negative)

Two unintended outcomes were cited in the ICR (paras. 68-69, pp. 25-26):

- After commissioning new and advanced equipment financed by the project, the laboratories of the PCBs in Telengana and West Bengal are now providing analytical services to external agencies for their research and consulting services, which is generating additional revenue for these agencies. In addition, the CPCB considers the laboratory at TPCB to be a regional resource for training and capacity building.
- Based on the National Action Plan for Chemicals Management prepared through the project, MoEF&CC is reportedly considering improvements to the pertinent GoI rules including: (i) merging the Manufacture, Storage, and Import of Hazardous Chemicals Rules of 1989 and the Chemical Accidents Rules of 1996 and developing the Hazardous Chemicals Management Rules; (ii) developing the Hazardous Substances and Dangerous Goods (Classification, Packaging, and Labeling) Rules; and (iii) amendments to the Public Liability Insurance Act.

d. Other

Gender. About 45 percent of the direct project beneficiaries were women. According to the ICR (para. 63, pg. 24), moreover, "counselling and awareness programs conducted as part of the SMP implementation for three remediation sites (including NMK Lake in Hyderabad that was dropped in 2017) indirectly contributed to the improvement in health, hygiene and routine occupational practices of pig rearing and rag-picking communities around project sites, which included women." More specifically, it cites the finding from the social audit conducted at the Kadapa dump site remediation subproject that about 72 percent of the women among the project affected people reported improvements in the health status of mothers and children.

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Satisfactory	---
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	---
Quality of M&E	Substantial	Modest	The ICR provides insufficient information regarding the utilization of M&E to justify a Substantial rating



Quality of ICR	Substantial	---
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12. Lessons

The lessons learned drawn from the ICR are relevant and useful. The most important are the following:

- 1. Detailed assessment of site contamination and the associated remediation plan are an essential element of readiness for remediation projects.** More specifically, remediation projects should be designed on the basis of: (i) detailed assessment of site contamination to identify, delineate, characterize, and quantify pollution patterns for a given site; and (ii) the associated remediation plan should include a risk analysis that sets risk-based targets for the post-remediation use of the site and identifies methods, clear material flows and disposal pathways, together with a detailed implementation plan and budget.
- 2. Thorough due diligence of land ownership and liability issue should be carried out as a part of remediation planning.** Lack of clarity regarding land ownership, multiple ownership (public and private), and liability issues are common for contaminated sites. Thus, the situation in each potential case needs to be thoroughly investigated in advance of site selection and remediation planning.
- 3. Social development and livelihood support to affected communities around contaminated sites should be an integral part of remediation plans.** This is especially the case for municipal solid waste dumps where informal activities tend to proliferate, as was the case in the current project.
- 4. Development of an alternative waste disposal facility should likewise be an integral part of closure and containment programs for municipal solid waste sites.** The experience of the present project in this regard was not particularly positive. In the case of the Kadapa site, the city needed to develop an alternative facility for the disposal of solid waste, but, according to the ICR (para. 116, pg. 35), this "did not progress with desirable speed," which was attributed to the "limited technical and financial capabilities of the municipalities." The very appropriate associated recommendation is that "any project on remediation of [a]municipal waste disposal site should essentially integrate development of alternative landfill sites for the cities/town."

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR is well-written, clear, and of good quality. It provides a very good account of the project's design shortcomings and implementation difficulties. Its ratings appear to be generally appropriate and well-justified, the single exception being for M&E, which appears to be too high on the basis of the information presented. On the other hand, the economic analysis in the ICR goes beyond that undertaken in the PAD and is quite comprehensive, as was the discussion with regard to project performance in relation to environmental and social safeguards, one of which (the Indigenous Peoples OP) was only triggered at the time the project was restructured in May 2016. The ICR also draws a number of significant lessons that are clearly based on the



project experience and will be useful for any future operations of a similar nature. While it was delivered nine months after the official closing date (March 2018), the project team requested and a two-month extension to ensure that all civil works for the two pilot remediation sites were completed and because of a similar extension of the grace period for disbursements for the same purpose, although, according to the TTL, this turned out not to be required due to cost savings in relation to the initial estimates at both of these sites.

a. Quality of ICR Rating
Substantial